Jawaharlal Nehru Port Authority

DEVELOPMENT OF RAILWAY CONNECTIVITY TO 'GREENFIELD VADHVAN PORT' FROM NEW PAIGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR




DETAILED PROJECT REPORT

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Details of Detailed Project Report

Project Name	**:**	**Development of Railway Connectivity to 'Greenfield Vadhvan Port' from New Palghar Station of Western Dedicated Freight Corridor**
Contract No.	:	JNPA's Variation Order No. 3 dated: 05th December 2022
Document Name	:	**'Detailed Project Report' for Railway Connectivity**
Document No.	:	MRTCPL/20038/VPPL/Rail/FDPR/01
Report Submitted to	:	**Jawaharlal Nehru Port Authority (JNPA)**
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Acronym/ Abbreviations and Technical Terms

Acronym	Full Form
BCT	Mumbai Central
BG	Broad Gauge
BH	Borehole
CFS	Container Freight Station
CR	Core Recovery
DFCC	Dedicated Freight Corridor
DFCCIL	Dedicated Freight Corridor Corporation of India Limited
DN	Down
DPR	Detailed Project Report
DRD	Dahanu Road
DRM	Divisional Railway Manager
EDFC	Eastern Dedicated Freight Corridor
FSR	Feasibility Study Report
GAD	General Arrangement Drawing
GoI	Government of India
GoM	Government of Maharashtra
HYSD	High Yielding Strength Deformed
ICD	Inland Container Depot
IR	Indian Railways
IRPWM	Indian Railway Permanent Way Manual
IRS	Indian Railways Specification
JNPA	Jawaharlal Nehru Port Authority
KM	Kilometre
KRC	Kutch Railway Company Limited
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
M	Meter
MM	Millimetre
MEMU	Mainline Electrical Multiple Units
MMRDA	Mumbai Metropolitan Region Development Authority
MMTPA	Million Metric Tonne Per Annum
MRTCPL	M. R. Technofin Consultants Private Limited
MRVC	Mumbai Rail Vikas Nigam
MT	Metric Tonne
MUTP	Mumbai Urban Transport Project
PAR	Preliminary Assessment Report
PETS	Preliminary Engineering cum Traffic Survey
PHPDT	Peak Hour Peak Direction Trips
PPR	Pile Penetration Ratio
PRR	Penetration Resistance Ratio
PSC	Pre-Stressed Concrete
R & D	Receipts and Dispatch

RCC	Reinforced Cement Concrete
RDSO	Research Design and Standards Organisation
RFO	Rail Fly Over
RHDHV	Royal Haskoning DHV Consulting Private Limited
RITES	Rail India Technical and Economic Service
ROB	Road Over Bridge
ROR	Rail Over Rail
RQD	Rock Quality Designation
RUB	Rail Under Bridge
SSOD	Standard Schedule of Dimensions
T	Tonnes
TEU	Twenty Equivalent Unit
UIC	International Union of Railways
VPPL	Vadhvan Port Project Limited
VA	Variation Order
VR – DRD	Virar-Dahanu Road
VTN	Vaitarna
WB	World Bank
WDFC	Western Dedicated Freight Corridor
WR	Western Railway

Project at a Glance

Project at a Glance

The development of railway infrastructure is proposed to be done in Two phases till the year 2040. Phase 1 will be commensurate with the traffic projection for the year 2030. Phase 2 involves augmentation of container railway yards only, within the port.

Brief Summary of proposed Railway connectivity to Vadhvan Port (Phase-1) is as follows:

<table>
<tr><th>Sr. No.</th><th>Items</th><th>Details</th></tr>
<tr><td>1</td><td>Name of Project</td><td>Development of Railway Connectivity to 'Greenfield Vadhvan Port (VPPL)' located at Tal: Dahanu, Distt: Palghar (Maharashtra)</td></tr>
<tr><td>2</td><td>Serving station/Take-off</td><td>Serving station: 'New Palghar station' of Western Dedicated Freight Corridor (WDFC).

Take-off point of Vadhvan Port connectivity: - The Proposed Connectivity is taking off from Dead End of Future UP Loop Line No.1A by provision of a De-railing Switch (DS) at CH:992.50 (F/CSB) at New Saphale end of New Palghar station.

For connectivity of Vadhvan Port to WDFC, it is imperative to cross the WR Main line/WDFC Main Line/MRVC Lines by a Railway Fly Over (RFO)/ Rail Over Rail (ROR).</td></tr>
<tr><td>3</td><td>Total Traffic/Rakes Per Day (Phase-1)</td><td>• Traffic Details: - Inward & Outward
<table>
<tr><th>Year</th><th>EXIM Container (Inward/Outward)</th><th>LPG (Outward)</th><th>Fertilizer (Outward)</th><th>Total Rakes Per Day</th></tr>
<tr><td>2030</td><td>34</td><td>3</td><td>1</td><td>38</td></tr>
</table></td></tr>
<tr><td>4</td><td>Route Length of Rail connectivity</td><td>30.593 KM (From Take -off point of Vadhvan Port connectivity at New Palghar station to Last Dead End of Container yard).</td></tr>
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<tr><td>i</td><td>Civil Works</td><td>A) Proposed Work of VPPL at New Palghar Station of WDFC
• Take off from Dead End of Future UP Loop Line No.1A by proposed De-railing Switch (DS) at</td></tr>
</table>

Sr. No.	Items	Details
		CH:992.50 (F/CSB) at New Saphale end of New Palghar station. • After Take-off, insertion of a 1:12 New Crossover between WDFC UP Main Line and Extended Future UP Loop Line No.1A • Insertion of a 1:12 New Crossover between Loop Line No.1 of Holding yard and WDFC UP Main Line for direct reception of VPPL rake, by-passing Holding yard • Insertion of a 1:12 New Crossover Between WDFC UP Main Line to WDFC DN Main Line for direct dispatch of VPPL rake, by-passing Holding yard • Insertion of a 1:12 New Crossover between proposed DN Main Line of VPPL and WDFC UP Main Line at Saphale end for dispatch of VPPL rake towards Saphale/JNPA side. • Insertion of a 1:12 New Crossover between proposed DN Main Line of WDFC and UP Main Line of WDFC at Saphale end for reception of VPPL rake from Saphale/JNPA side. **B) Proposed Holding yard of VPPL at New Saphale end of New Palghar Station of WDFC:** • Loop Line No. 1: CSR- 1680.88 M • Loop Line No. 2: CSR- 1727.37 M • Loop Line No. 3: CSR – 1723.91 M • Loop Line No. 4: CSR - 1723.91 M • Loop Line No. 5: CSR – 1839.608 M • Loop Line No. 6: CSR – 1693.967 M • Loop Line No. 7: CSR-1549.696 M • Loop Line No. 7: CSR-1500.00 M **C) Double Line (Main/Lead Line)** After Holding yard of VPPL, 'Double Line' (Main/Lead Lines) of approximate 18.00 KM is proposed for Railway Connectivity to Vadhvan Port from the Holding Yard of VPPL to Proposed Railway Gate of Vadhvan In-Port Yard. **D) In-Port Yard of Vadhvan Port** In- Port yard is divided into Two (2) segments viz:

Sr. No.	Items	Details
		a) Container Yard b) LPG Handling Yard/Fertilizer Handling Yard **a) Container Yard:** **i) Container Stabling Yard:** • Stabling Line No.1: CSR- 1500 M • UP Main Line No.2: - CSR -1500 M • DN Main Line No.3: CSR -1500 M • Stabling Line No. 4: CSR-1500 M **ii) Container Handling Yard:** • Container yard is proposed to comprise of Three (3) groups (clusters) viz Group- A, B & C. Each group comprises of Six (6) lines of CSR-1500 M for Loading/Unloading of Container rakes and One (1) line as 'Sick line' of 140 M each. • Total No. of Lines: Eighteen (18) Container lines with CSR-1500 M each & Three (3) Sick lines with CSR-140 M each. • In-Motion Weigh Bridges: 03 Nos (01 No. for each group) **b) LPG Handling/Fertilizer Handling Yard:** **i) LPG Handling Yard:** • R&D Line No.1: CSR-750 M • Engine Escape Line No.2: CSR – 750 M • Dummy Wagon Line No.3: CSR – 100 M • LPG Loading Line No.4: CSR-750 M **ii) Fertilizer Handling Yard:** • Loading Line No.1.: CSR -750 M • Engine Reversal Line No.2: CSR- 750 M • Brake Van Line No.3: CSR- 75 M • Sick Line No.4.: CSR-140 M • In-Motion Weigh Bridge: 01 No.
ii	Curvatures	Total = 44 Nos. (34 Nos. on Lead Line, 10 Nos. on In-Port Yard)
iii	Road crossings	Total =25 Nos. (ROB – 2 Nos. and RUB – 23 Nos.)

Sr. No.	Items	Details
iv	RFO/ROR	1No.
v	Approach Trestle (2.616 KM long) for the Container Handling yard	1 No. (Inside In-Port Yard)
vi	Cross Drainages (Bridges)	Nullah/Canal = 09 Nos. (Major- 4 Nos. and Minor -5 Nos.)
vii	HT line Crossings	6 Nos.
viii	Gradient	Main Line: 1 in 200 In-Port Yard: Level/1 in 1200
vi	Speed potential.	Main/Lead line: 100 KMPH In-Port Yard: 50 KMPH
x	Type of OHE	2x25 KV 50 Hz High rise
xi	Type of Signalling	4 Aspects MACL with Electronic Interlocking (EI), Standard- III
xii	Railway Policy guideline	Vide Railway Board's letter no.2023/GS (T)/WR/Misc on 30.05.23, the Railways has decided that Vadhvan Port Connectivity Project will now be under taken by Indian Railway (IR).
xiii	Type of Railway Wagons	• BLC (Bogie Low platform Container) • BTPGLN (Bogie Tanker Petroleum Gas Frameless Pneumatic brake) • BCNHL (Bogie Covered Pneumatic-brake Higher Load)
xiv	Free Time for Loading/Unloading of Containers Rakes, Loading of LPG & Fertilizer Rakes	1. Container Rake: Double Stack Normal rake (180 TEUs) – 10.0 hours & Double Stack Long haul rake (360 TEUs)- 20.0 hours 2. LPG Rake: Loading – 6.0 hours (Mechanized) 3. Fertilizer Rake: Loading – 11.0 hours (Manual)

Sr. No.	Items	Details
xv	Speed potential	• 100 KMPH: From Holding yard to In-Port yard Gate through RFO/ROR & • 30 KMPH: Inside In-Port yard.
7	**Summary of Cost Estimate of Railway Infrastructure (Phase-1)**	
i	Civil	Rs 888.42 Crore
ii	Mechanical	Rs 5.90 Crore
iii	Electrical	Rs 126.52 Crore
iv	S&T	Rs 96.58 Crore
v	Total	Rs. 1117.41 Crore
vi	Provisional Sum (To cover Railway Departmental Charges, Engineering Designs, Environmental Related Works, Price Escalation, Taxation & other items) @12%	Rs.134.09 Crore
v	Contingency @2%	Rs 25.02 Crore
vi	**Total Cost of Project (Phase-1)**	**Rs 1276.53 Crore**
	Estimated Cost of 'In Port' augmentation for Phase-2	***Rs. 108.06 Crore***
	Total Project Cost	***Rs. 1384.60 Crore***
	The Section-wise breakup of the assessed Project Cost is as follows: **(1) Project Cost up to the Port Gate (included in Phase 1 of the Project) – Rs. 982.26 Crores** **(2) Project Cost inside the Port Gate:** a. Under Phase 1 – Rs. 294.28 Crores b. Under Phase 2 – Rs. 108.06 Crores **Inside the Port Gate – Total for Phase 1 and Phase 2 – Rs 402.34 Crores** **(3) Total Project Cost** **Adding the two, the final project cost, including Phase 1 and Phase 2, is Rs 1384.60 Crores**	

Executive Summary

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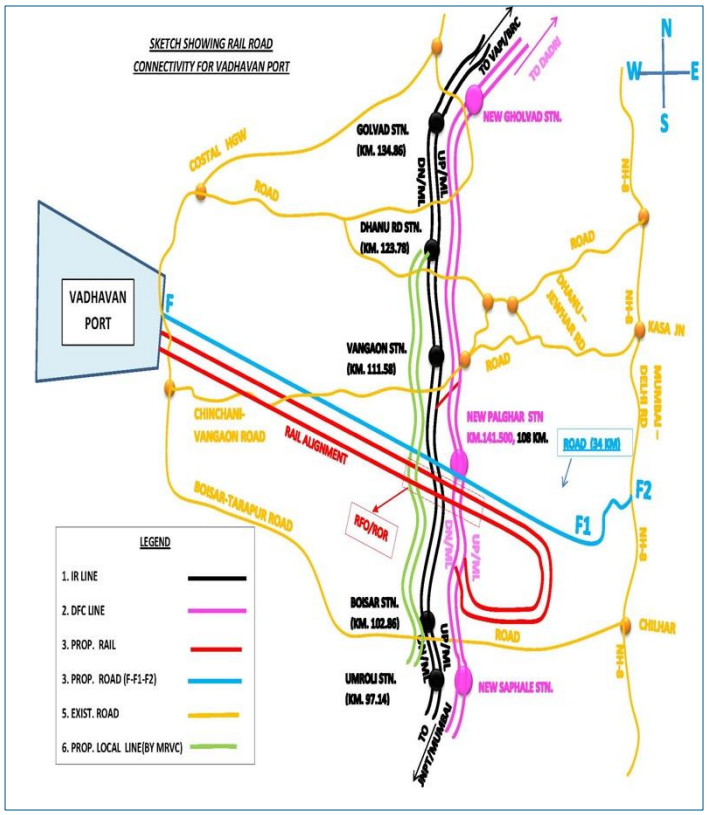
01. The Jawaharlal Nehru Port Authority (JNPA) at Navi Mumbai is the premier container handling port in India, accounting for around 50% of the total containerized cargo volume across the major ports of India.
02. Currently, JNPA operates Five Container Terminals: Jawaharlal Nehru Port Container Terminal (JNPCT)- managed by consortium of JM Baxi Ports & Logistics-India & CMA Terminal-France, Nhava Sheva International Container Terminal (NSICT)-managed by DP World-Dubai, Gateway Terminals India Pvt. Ltd. (GTIPL)-managed by consortium of APM Terminals- Netherlands & CONCOR-India, Nhava Sheva International Gateway Terminal (NSIGT)-managed by DP World- Dubai, and Bharat Mumbai Container Terminals Private Limited (BMCT)-managed by PSA Pvt Ltd- Singapore. In addition, the port has a Shallow Water Berth for general cargo and a Liquid Cargo Terminal- managed by BPCL-IOCL consortium.
03. JNPA has proposed to develop Vadhvan Port with the participation of Govt of Maharashtra and Maharashtra Maritime Board (MMB) and a MOU was signed on 5th June 2015 to set up a new port at Vadhvan as a Major Port to be notified under the Indian Ports Act 1908 by Government of India as Vadhvan Port Project Limited (VPPL). This port will be jointly implemented by JNPA and Maharashtra Maritime Board with a shareholding of 74% and 26% respectively. The port will be developed based on 'Landlord Port' policy.
04. Vadhvan Port is located near Dahanu, abutting northern boundary of Palghar district of Maharashtra State. The site is located at about 150 KM north of Mumbai, about 150 KM west of Nashik and about 180 KM south of Surat.
05. The Port is also located at about 12 KM west of Vangaon Railway Station on Mumbai- Delhi Main lines of Western Railway (WR).



06. Government of India had established the Dedicated Freight Corridor Corporation of India (DFCCIL) on 30th October 2006, aimed at decongesting Indian Railways network by moving 70% of Indian Railways freight train by constructing two freight corridors viz Western Dedicated Freight Corridor (Western DFC) from Dadri in Uttar Pradesh to JNPA/Navi Mumbai in Maharashtra and Eastern Dedicated Freight Corridor (Eastern DFC) from Ludhiana in Punjab to Dankuni in West Bengal via Khurja in Uttar Pradesh.

07. Western Dedicated Freight Corridor (WDFC) runs parallel and east side of the existing Mumbai-Delhi Main lines of Western Railway.
08. The Port is located about 12 KM west of the proposed New Palghar Crossing Station of Western Dedicated Freight Corridor (WDFC).
09. Mumbai Rail Vikas Corporation Ltd (MRVC) Ltd, a joint venture of Indian Railways & Government of Maharashtra, has sanctioned execution of two new lines (3rd and 4th lines) from Virar to Dahanu Road, running west and parallel to existing Mumbai-Delhi Main lines of Western Railway.
10. Direct Railway connectivity from Vadhvan Port to Western Railway will involve surface crossing of upcoming MRVC lines, hence found to be 'not viable'.
11. It is proposed to provide direct Railway connectivity from Vadhvan Port to New Palghar station of WDFC by providing Rail-Over-Rail (ROR) / Railway Fly Over (RFO) for crossing WR Main lines, proposed MRVC lines and WDFC Main/Loop Lines.
12. JNPA has appointed M/s Royal Haskoning DHV (RHDHV) India, as a Project Consultant for development of complete infrastructures of Vadhvan Port such as Marine Structures, Road and Rail connectivity, Breakwaters and other Infrastructure.
13. RHDHV has partnered with **M. R. Technofin Consultants Private Ltd (MRTCPL)**, a specialist in Transportation Studies and Designs and an 'Approved Western Railway & DFCCIL Consultant' to undertake preparation of Feasibility Study Report (FSR), Detailed Project Report (DPR) and Engineering Scale Plan (ESP) related to Railway connectivity of Vadhvan Port.
14. Vide letter no. 2023/GS (T)/WR/Misc on 30.05.23, Railway Board has decided that Vadhvan Port Connectivity project will now be under taken by Indian Railway (IR).
15. Vadhvan Port envisages to handle Rail Traffic in Two Phases viz Phase-1 (Year 2030) & Phase-1I (Year 2040).
16. Rail Traffic: Phase-1 (Year 2030)
    - Container rakes (EXIM) Per Day (Inward +Outward)- 34.0
    - LPG rakes Per Day (Outward)- 3.0
    - Fertilizer rakes Per Day (Out ward)- 1.0

      Total rakes Per Day- 38.0
17. Vadhvan Port envisages to handle unloading /loading of Containerized EXIM traffic in Container wagons (BLC), loading of Fertilizer ('Bagged') in Covered wagons (BCNHL) and loading of LPG in Tank wagons (BTPGLN).
18. On WDFC, container rakes are of 'Long haul' length with 'Double Stack Containers' on each BLC wagon. Hence, carrying capacity of each 'Double Stack Long haul BLC rake of WDFC' is 360 TEUs (90 BLC wagons).
19. Container rakes of Vadhvan Port will be 'Double Stack' of both 'Long haul (90 BLC wagons)' and 'Normal (45 BLC wagons)' lengths in the proportion of 70% and 30% respectively.
20. LPG and Fertilizer traffic of Vadhvan Port will be handled in 'Normal Indian Railways' rakes.

21. Feasibility Study Report for Railway connectivity to Vadhvan Port from New Palghar station of WDFC was submitted to DFCCIL on 06.03.2023.
22. Detailed Topographic Survey by DGPS & Total Station of the complete alignment via RFO/ROR from New Palghar station to last Dead End of Vadhvan Port yard, has been carried out in parts by the Consultant (MRTCPL) and by JNPA.
23. Topographic Survey for area of west of MRVC line up to proposed entry & Port yard was carried out by JNPA. Topographic survey for area east of WDFC Main line & RFO/ROR was carried out by MRTCPL.
24. After take-off, the proposed main/lead double line of Vadhvan Port starts from New Palghar Station of WDFC. The main/lead double line takes a turn on southeast side and proceeds towards proposed Holding yard of Vadhvan Port.
25. After the holding yard of Vadhvan Port at New Palghar Station at Saphale end, the proposed main/lead double line will run for approximately 7 KM and cross the DFCC main lines, IR lines, and proposed MRVC lines through Rail Fly Over (RFO)/Rail Over Rail (ROR).
26. After the RFO/ROR, the proposed main/lead double line further proceeds towards Vadhvan Port for approximately 11 KM and enters the Vadhvan port, where facilities have been proposed for the loading and unloading of container rakes, the loading of LPG rakes, and the loading of Fertiliser rakes.
27. Total Route KM of Railway connectivity of Vadhvan Port will be 30.592 KM (From Take - off point of Vadhvan Port connectivity at New Palghar station to farthest Dead End of In-Port yard).
28. New Palghar station on Vaitarana– Sachin 'Electrified' Double line section of WDFC at KM. 141+490 will be the 'Serving Station' for Railway connectivity for upcoming Vadhvan Port. The station consists of Two Main lines, Two Loop lines, Two Machine sidings, One Hot Axle siding and One Platform.
29. Railway connectivity of upcoming Vadhvan Port is taking off from Dismantled Dead End of Future UP Loop Line No.1A by De-railing Switch (DS)/Trap Point (TP) at CH:992.50 (F/CSB) at New Saphale/JNPA end of New Palghar station.
30. After take-off, a 'Holding yard' in 'Private Land' at New Saphale end of New Palghar station is proposed with connectivity from New Palghar station for Receipt & Dispatch of Vadhvan traffic.
31. Holding Yard will consist of 'Fully Wired' Eight (8) 'Long haul' lines.
32. After 'Holding yard', proposed 'Fully Wired' Main/Lead Double line (alignment) will take a turn on southeast side and run for approximately 7 KM on 'Private Land' to cross over the WDFC main lines, WR lines, and proposed MRVC lines including Rail Fly Over (RFO)/Rail Over Rail (ROR). This stretch will cross existing Major/Minor roads at Seven (7) locations, for which ROB/RUBs are proposed.
33. After the end of RFO/ROR, the proposed 'Fully Wired' Main/Lead Double line (alignment) will proceed towards Vadhvan Port for approximately 11 KM on 'Private Land/ to enter the Port Railway Gate of In-Port yard of Vadhvan port, where facilities have been proposed for loading/unloading of Container rakes, loading of LPG rakes and loading of Fertiliser rakes. This stretch will cross existing Major/Minor roads at Eighteen (18) locations, for which ROB/RUBs are proposed. This stretch will also cross Three (03) Nullahs, for which Major/Minor bridges are proposed.

34. The 'Fully Wired' Main/Lead Double Line (alignment) of proposed Vadhvan Port from Take-off to Port Railway Gate of In-Port yard will be on 'Private Land'.
35. A Feasibility Study Report was submitted to DFCCIL in December 2022 for the proposed RFO/ROR of 'Open Web Girder' of various spanning arrangement with overall girder length of 302.7 m. The same has been approved/accepted by DFCCIL in February 2023. The details of RFO/ROR are incorporated in Chapter 6.5.
36. Container Yard consists of Stabling yard of Four (4) lines, Approach Trestle to Handling yard of 2.60 KM long and Holding yard with Three (3) Clusters with each of Six (6) Un-loading/Loading lines and One (1) Sick line. All the lines in container yard will be of 'Long haul' length except for sick line of 140m.
37. LPG yard has Four (4) lines for loading of LPG rakes, consisting one each of R&D line, loading line, engine line and dummy wagon line.
38. Fertilizer yard has Four (4) lines for loading of fertilizer rakes, consisting one each of loading line, engine reversal, brake van line and sick line.
39. WDFC have proposed to introduce 'End of Train Telemetry system (EOTT)' in their Container rakes to run 'Without Guard'. Hence, no Brake van will be provided in Container rakes. However, LPG & Fertilizer rakes will include Brake van for Guard.
40. Salient features of Railway connectivity of Vadhvan Port are tabulated below as **Table 0-1:**

Table 0-1, Salient features for Railway Connectivity of VPPL

S/N	Description	Features
1	Gauge	1676 mm (Broad Gauge)
	Route Length (Double line)	30.593 KM (From Take -off point of Vadhvan Port connectivity at New Palghar station to Last Dead End of Container yard).
2	Total Track Length	136 KM (including In-Port yard)
3	No. of Curvatures	Lead line (From Holding yard to Proposed Port Railway Gate): 34 Nos. (Max. 2 Degree) In-Port yard: 10 Nos (Max. 4 Degree)
4	No. of Road Crossings	Total=25 Nos. (RUB – 23 Nos., ROB– 02 Nos.)
5	No. of RFO/ROR	01 No (For crossing WDFC Main lines, WR Main lines & MRVC Main lines)
6	Approach Trestle to Handling yard	2.60 KM
7	No. of Nullah/Canal Crossings (Bridges)	Total = 09 Nos. (Major – 04 Nos., Minor – 05 Nos.)
8	Electronic In-motion Weighbridges	04 Nos
9	Ruling Gradient	Main Line: 1 in 200 In-Port Yard: Level/1 in 1200
10	Rails	60Kg.

11	Ballast Cushion	Hard Stone ballast 50mm nominal size with 300mm cushion (For Loop line) & 350mm (For Main line)
12	Sleepers	PSC 68Kg wider gauge Monoblock with a Sleeper Density 1540Nos. per KM (For Loop line) & 1660Nos. per KM (For Main line)
13	Point & Crossings	
(a)	Proposed Connectivity	60Kg 1in 8.5 Thick web (CS) with CMS crossing on 60kg PSC turnout with sleepers of fan shaped layout.
(b)	Take off	60 Kg, 1in12 Thick web (CS)
14	Traction (Electric)	• 2x 25 KV AC High Rise OHE from Take off to In- Port yard Gate and • 1x 25 KV AC High Rise OHE inside In-Port yard.
15	Standards of Signalling &Telecommunication	EI of Standard-III with MACLS and other systems installed in WDFC
16	No. of Control Panels	03 Nos (Cabin 'A', Cabin 'B' & 'Port Station')
17	Type of Railway Wagons	• BLC for Un-loading/Loading of Containers • BTPGLN for Loading of LPG • BCNHL for Loading of Fertilizer Bags
18	Pattern of Un-loading and Loading	• Un-loading/Loading of Containers: 'Mechanized' by Rail Mounted Gantry Crane (RMGC) from Top • Loading of LPG: 'Mechanized' by Gantry/Loading Arms from Top • Loading of Fertilizer Bags: 'Manual' through Side doors of wagon
19	Free Time for Loading & Un-loading	Railway Board's Rates Circular for Demurrage-Wharfage-Waiver /2016/0
20	Charging of Freight	Through Distance Basis
21	Speed potential	• 100 KMPH: From Holding yard to In-Port yard Gate through RFO/ROR & • 30 KMPH: Inside In-Port yard.

41. Traffic of Vadhvan Port will arrive/depart both from /to New Golvad (Vadodara) and New Saphale (JNPA) ends. System of Working of Vadhvan Port traffic has been proposed accordingly.
42. On Main and Running lines, WDFC proposes to provide 4 Aspect Multi Aspect Colour Light (MACL) LED Signals with Multi Section Digital Axle Counter (MSDAC). WDFC proposes to install MACL signals with spacing of 2 km for main and running lines. Signalling system shall be Electronic Interlocking (EI) of Standard -III. Signalling system on WDFC will also have function of Train Detection (TD), Train Protection Warning System (TPWS), Automatic signalling in Block section and Train Monitoring & Diagnostic System (TMS). All points on WDFC will be Electric Points.
43. The signalling arrangement of Holding yard/lead line and In-Port yard has to be compliant with WDFC standards. Vadhvan Port railway connectivity will be provided with a signalling system which will integrate with the signalling system of WDFC.

44. The proposed Vadhvan Port Railway connectivity will be divided into Three (3) Sections for operation of Vadhvan Port rakes. The sections will be controlled by Three (3) Cabins/Stations. The sections are:
    - Section-1 (Cabin 'A'): From Holding yard to west side of RFO/ROR.
    - Section-2 (Cabin 'B'): From west side of RFO/ROR to In-Port Railway Gate.
    - Section-3 ('Port Station'): From In-Port Railway Gate to Last Dead end.
45. Automatic Signalling will be provided for train operation between:
    - 'Cabin A' to Cabin 'B' & 'Cabin B' to 'Port Station'.
46. Telecommunications System will generally comprise of two main subsystems which would include Fibre Optic Cable Communication System (OFC) & GSM-R (Global System for Mobile communication- Railways). Additional systems of Electronic Private Automatic Branch Exchange Telephone System, Dispatch Telephone System, Master Clock System and Video Surveillance System. The system will provide all necessary communication channels for carrying voice, data, and video signals for railway management.
47. OFC backbone transmission network will provide the necessary communication channels on the Vadhvan Port Railway system.
48. To avoid engine reversal at Holding yard, DFCCIL have indicated that Vadhvan Port container rakes from WDFC will be placed at In-Port yard with Electric locomotive at either end. The leading loco will be in 'operation' & the rear loco will be in 'dead condition'.
49. WDFC is 'Electrified with High rise 2X25KV OHE' to operate Double stacked container trains. Hence, Railway connectivity of Vadhvan Port from New Palghar station will also be 'Electrified with High rise 2X25 KV OHE' upto the Gate of In-Port yard. However, In-Port yard will be 'Electrified with High rise 1x25 KV OHE'.
50. Loading/unloading of Containers will be carried out from top by 'Rail Mounted Gantry Crane (RMGC). Hence, the lines handling containers cannot be 'Fully Electrified'. Only 'Top wiring' can be provided on container handling lines. Similarly, only 'Top wiring' can be provided on LPG loading line since LPG will be loaded from top by 'LPG Loading Gantry'. However, since Fertilizer Bags will be loaded, Fertilizer Loading line can be 'Fully Electrified'.
51. Total TKM for OHE is estimated to be 103.00 TKM. Out of which, 54 TKM will be wired with 2x25 KV AT feeding system and the rest 49 TKM will be wired with 25 KV feeding system.
52. A New SSP with modification of existing SSP at New Palghar with DP Circuit Breaker, AT, DP Interrupter is proposed for power supply to OHE of Vadhvan Port.
53. Vadhvan Port will provide adequate High Mast Tower based light, other forms of illumination and general-electric supply inside In-Port yard. However, additional illumination, if required, for Railway yard will be carried out by Vadhvan Port.
54. EXIM Traffic of Containers will be unloaded followed by loaded on the same wagon.
55. As per extant guidelines issued by Railway Board vide Rates Circular Demurrage-Wharfage-Waiver /2016/0, Permissible Free Time of double operation of container rake (90 TEUs) i.e., unloading followed by loading in same wagons shall be 5.0 hours. Accordingly, Permissible Free Time applicable for loading/unloading of Containers in

Double Stack Normal rake (180 TEUs) & Double Stack Long haul rake (360 TEUs) will be 10.0 hours & 20.0 hours respectively.

56. The rakes of Vadhvan Port will consist of 'Double Stack Normal (180 TEUs)' & 'Double Stack Long-haul (360 TEUs)' in the ration of 70% & 30% respectively.
57. In Container Handing yard, 18 lines (in 3 clusters/groups) have been proposed for loading/unloading, sufficient to handle 17 container rakes each way per day on double line within the stipulated free time.
58. As per extant guideline Issued by Railway Board vide Rates Circular Demurrage-Wharfage-Waiver /2016/0, Permissible Free Time for loading of LPG & Fertilizer will be 6.0 hours & 11.0 hours respectively.
59. Four (4) In-motion Weigh Bridges (IMWBs) as per RDSO Specification no WD-29-MISC-19 (Rev.1) with tangent length of 100 meters on either side are proposed.
60. For preparation RRs for outward Container, LPG & Fertilizer traffic, Railway Commercial Staff will be posted inside Port yard. d 'No Cost of Commercial Staff shall be charged by Railway'.
61. TMS hardware peripheral will be installed by Vadhvan Port in Railway Service Building, Air Conditioned for FOIS and for issuing computerized RRs. Railway will provide the Software.
62. Office accommodation for commercial staff and Air- Conditioned Train Crew Rest room will be provided by VPPL in the Railway Service Building.
63. Freight or haulage charges on traffic booked from and to Vadhvan Port will be charged, on the basis of charging of Freight on 'Through Distance Basis' as per Rates Master Circular of 2014 issued by Railway Board.
64. No C&W facility is proposed inside Port yard. However, if C&W facilities are operationally required as per extant instructions, only one- time capital cost for setting-up C&W facilities shall be borne by Vadhvan Port. Operational cost including staff cost shall however be borne by Railway.
65. Shunting operation of all rakes inside In-Port yard will be carried by the Train Electric Engine. Hence, there is no necessity to procure captive Shunting Locomotives for VPPL. Hence, no Loco Shed has been proposed.
66. To attend minor derailment of any wagon on lead line and inside Port yard, VPPL will procure Re-railing equipment viz MFD, hydraulic & screw jacks, chain pulley block, tools, measuring instruments, gauges etc.
67. Summary of Cost Estimate of proposed Railway Infrastructure of Vadhvan Port excluding Railway Fees has been tabulated below as **Table 0-2:**

Table 0-2, Summary of Cost Estimate of Railway Infrastructure of Vadhvan Port JNPA

Civil	Rs 888.42 Crore
Mechanical	Rs 5.90 Crore
Electrical	Rs 126.52 Crore
S&T	Rs 96.58 Crore

Provisional Sum (To cover Engineering Designs, Price Escalation, Taxation & other items) @10%	Rs.134.09 Crore
Contingency @2%	Rs 25.03 Crore
Total Cost of Project (Phase-1)	Rs 1276.53 Crore
Estimated Cost of 'In Port' augmentation for Phase-2	***Rs 108.06 Crores***
Total Project Cost	**Rs 1384.60 Crore**

The Section-wise breakup of the assessed Project Cost is as follows:

(1) Project Cost up to the Port Gate (included in Phase 1 of the Project) – Rs. 982.26 Crores

This includes cost of Civil, Track, Bridges, OHE, Mechanical, etc. from the WDFC junction / take off from New Palghar station to the Port Gate. However, the cost of Control Systems i.e., S&T costs, include the cost of S&T infrastructure inside the gate too since for the efficacy of the whole railway infrastructure a seamless operational system will be necessary. This cost also include the assessed cost of Railway Fly Over (ROR/RFO) at New Palghar.

(2) Project Cost inside the Port Gate:

a. Under Phase 1 – Rs. 294.28 Crores
b. Under Phase 2 – Rs. 108.06 Crores

Inside the Port Gate – Total for Phase 1 and Phase 2 – Rs 402.34 Crores

(3) Total Project Cost

Adding the two, the final project cost, including Phase 1 and Phase 2, is Rs 1384.60 Crores

1 Introduction & Background

1.1 About Jawaharlal Nehru Port Authority (JNPA)

The Jawaharlal Nehru Port Authority (JNPA) at Navi Mumbai is the premier container handling port in India, accounting for around 50% of the total containerized cargo volume, across the major ports of India. Commissioned on 26th May 1989, in three decades of its operations, JNPA has transformed from a bulk- cargo terminal to become the premier container port in the country. JNPA is connected to over 200 ports in the world and is ranked 26th in the list of top 100 Container Ports globally.

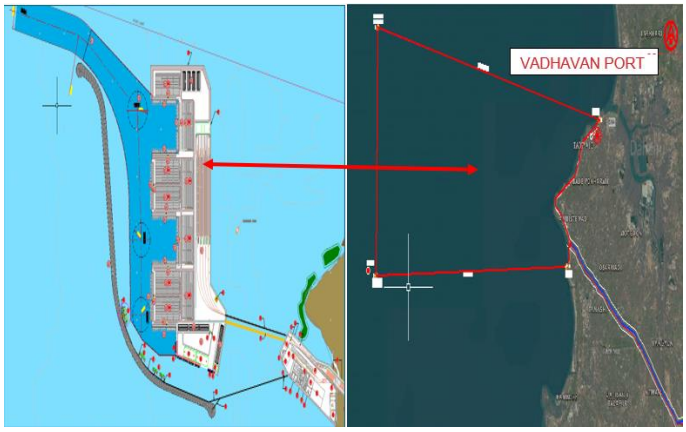
Currently, JNPA operates Five Container Terminals: Jawaharlal Nehru Port Container Terminal (JNPCT)- managed by consortium of JM Baxi Ports & Logistics-India & CMA Terminal-France, Nhava Sheva International Container Terminal (NSICT)-managed by DP World-Dubai, Gateway Terminals India Pvt. Ltd. (GTIPL)-managed by consortium of APM Terminals-Netherlands & CONCOR-India, Nhava Sheva International Gateway Terminal (NSIGT)-managed by DP World- Dubai, and Bharat Mumbai Container Terminals Private Limited (BMCT)-managed by PSA Pvt Ltd- Singapore. In addition, the port has a Shallow Water Berth for general cargo and a Liquid Cargo Terminal- managed by BPCL-IOCL consortium.

The Fourth Container Terminal is being developed in two phases of which Phase-1 is operational and Phase-1I is expected to be fully operational by 2025-2026 with a quay length of 2,000 metres adding an annual capacity of 4.8 million TEUs. JNPA has developed a multi-product SEZ in its owned free hold land of 277 hectares to attract international capital and global giants in manufacturing. In addition, the JNPA is also developing a port at Vadhvan and 4 Dry Ports – Jalna, Wardha, Sangli and Nashik to promote industrialization of the hinterland. JNPA has firmly anchored itself as the major catalyst for the trade and commerce in the country and is strongly committed to providing seamless services to the world that docks here.

1.2 About Vadhvan Port Project Limited (VPPL)

Maharashtra has only two major ports i.e., Mumbai Port and Jawahar Lal Nehru Port (JNPA). Mumbai Port is constrained in the evacuation of cargo for the past several decades due to the development of the city around it as well as due to limited depths in the harbour which allows only small ships to berth. Arabian Sea coast at Vadhvan, about 100 nautical mile north of Mumbai is most suitable and ideal for the development of a new port where natural a depth of 20 M is available at a distance of about 4 ½ nautical miles. The location is about 10 KM from the National Railway grid and about 35-40 KM from NH8.

1.3 Project Background



JNPA has proposed to develop Vadhvan Port with the participation of Govt of Maharashtra and Maharashtra Maritime Board (MMB) and a MOU were signed on 5th June 2015 to set up a new port at Vadhvan as a Major Port to be notified under the Indian Ports Act 1908 by Government of India. This port will be jointly implemented by JNPA and Maharashtra Maritime Board with a shareholding of 74% and 26% respectively. The port will be developed based on Landlord Port.

The proposed port is located at Vadhvan near Dahanu, abutting northern boundary of Palghar district of Maharashtra at co-ordinates Latitude 19°55.8'N and Longitude 72°39.6'E. Vadhvan Port site has natural and strategic advantages. The site is about 150 KM north of Mumbai and about 150 KM west Nashik and about 180 KM south of Surat respectively.

The upcoming Vadhvan port has proposed to develop Container/Liquid/ Multipurpose/Terminal within the port.

Vadhvan Port envisages to handle Container, LPG and Fertilizer traffic through rail as well as road within the port.

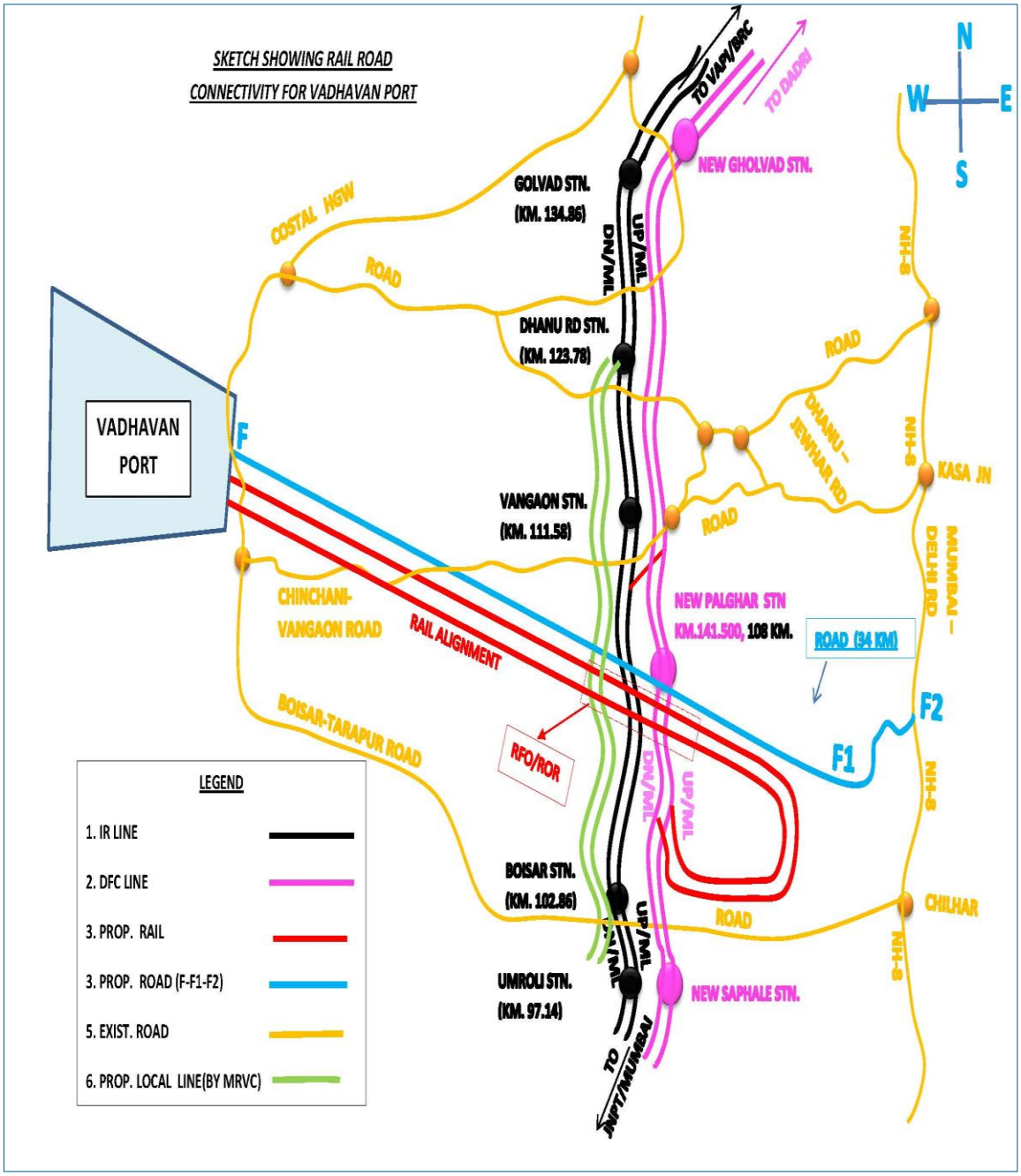
Vadhvan Port is about 12 KM from Vangaon Railway Station of Mumbai- Delhi Western Railway route and about same distance from the proposed New Palghar crossing station of Western Dedicated Freight corridor which runs parallel to Mumbai -Delhi Western Railway Main line.

Western Dedicated Freight Corridor (WDFC) is running parallel to existing Western Railway Main line in the same corridor on east side. Vadhvan Port location is on the west side of existing Mumbai- Delhi Railway main line. Thus, Vadhvan port is located on the opposite side of WDFC, which necessitates a Rail-Over-Rail (ROR) / Railway Fly Over (RFO) for crossing the existing railway corridors. **JNPA in co-ordination with Indian Railways is planning ''Railway Connectivity'' from Vadhvan Port to New Palghar station of WDFC by providing Rail-Over-Rail (ROR) / Railway Fly Over (RFO) for crossing WR Main lines, proposed MRVC lines and WDFC Main/Loop Lines.**

For development of complete infrastructures of Vadhvan Port such as Marine Structures, Road and Rail connectivity, Breakwaters and other Infrastructure, JNPA has appointed M/s Royal Haskoning DHV (RHDHV) India, as a Project Consultant for this project. RHDHV has partnered with **M. R. Technofin Consultants Pvt. Ltd (MRTCPL),** a specialist in Transportation Studies and Designs and an **'Approved Western Railway & DFCCIL Consultant'** to undertake **preparation of Feasibility Study Report (FSR), Detailed Project Report (DPR) and Engineering Scale Plan (ESP) related to Railway connectivity of Vadhvan Port.**

The sketch showing Rail and Road connectivity of Vadhvan Port is placed below:

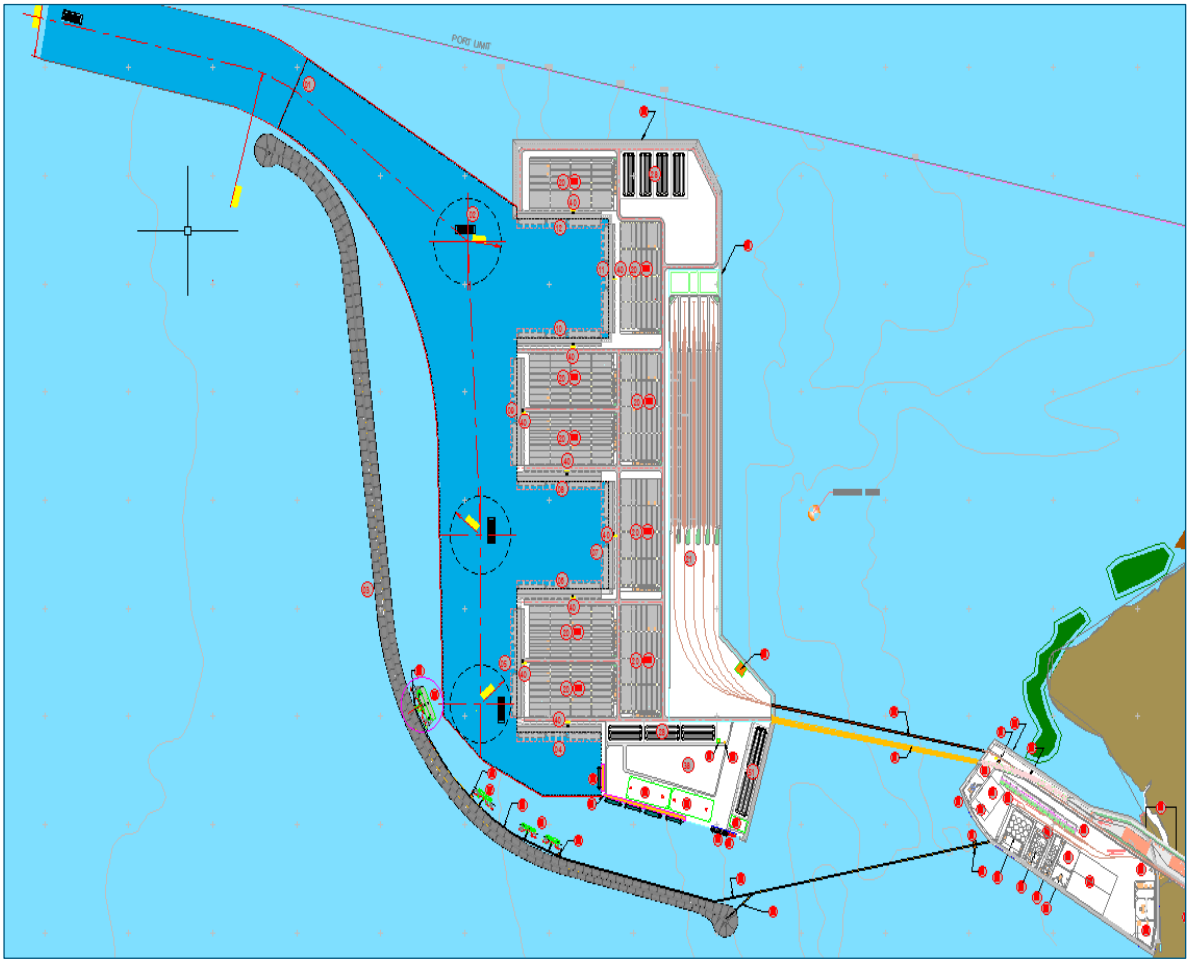
Figure 1-1 Rail and Road Connectivity of Vadhvan Port



1.4 Master Plan of Vadhvan Port

Master Plan of Vadhvan Port prepared by M/s Royal Haskoning DHV is shown below:

Figure 1-2 Master Plan of Vadhvan Port

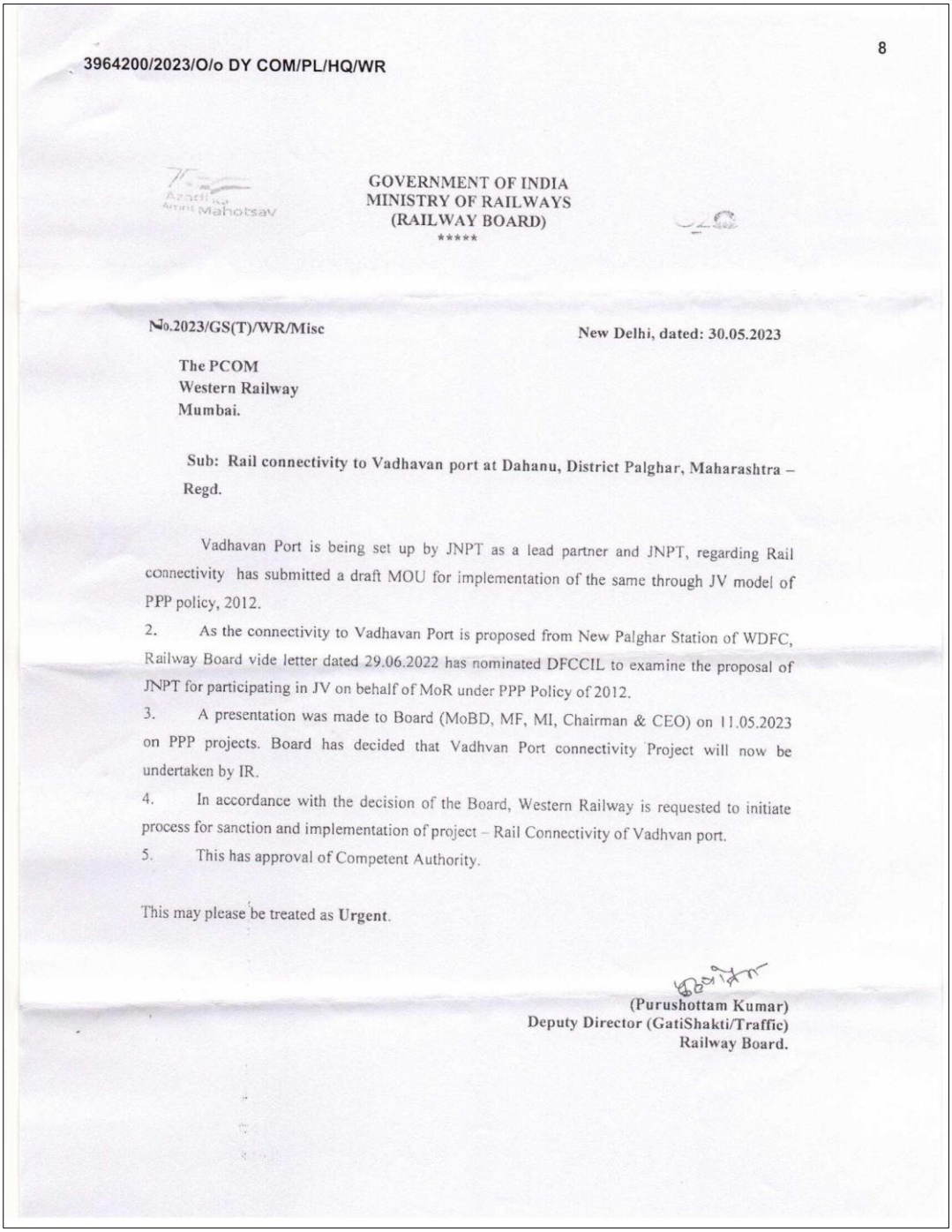


1.5 Railway Board Letter No. 2023/GS (T)/WR/Misc on 30.05.2023 related to Vadhvan Port Rail Connectivity d

Vide letter no.2023/GS (T)/WR/Misc on 30.05.23, Railway board has decided that Vadhvan Port Connectivity Project will now be under taken by Indian Railway (IR).

The copy of the letter is placed below:-

Figure 1-3, Railway Board Letter for Vadhvan Port Rail Connectivity



3964200/2023/O/o DY COM/PL/HQ/WR

8

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)
*****

No.2023/GS(T)/WR/Misc

New Delhi, dated: 30.05.2023

The PCOM
Western Railway
Mumbai.

Sub: Rail connectivity to Vadhavan port at Dahanu, District Palghar, Maharashtra – Regd.

Vadhavan Port is being set up by JNPT as a lead partner and JNPT, regarding Rail connectivity has submitted a draft MOU for implementation of the same through JV model of PPP policy, 2012.

2. As the connectivity to Vadhavan Port is proposed from New Palghar Station of WDFC, Railway Board vide letter dated 29.06.2022 has nominated DFCCIL to examine the proposal of JNPT for participating in JV on behalf of MoR under PPP Policy of 2012.

3. A presentation was made to Board (MoBD, MF, MI, Chairman & CEO) on 11.05.2023 on PPP projects. Board has decided that Vadhvan Port connectivity Project will now be undertaken by IR.

4. In accordance with the decision of the Board, Western Railway is requested to initiate process for sanction and implementation of project – Rail Connectivity of Vadhvan port.

5. This has approval of Competent Authority.

This may please be treated as Urgent.

(Purushottam Kumar)
Deputy Director (GatiShakti/Traffic)
Railway Board.

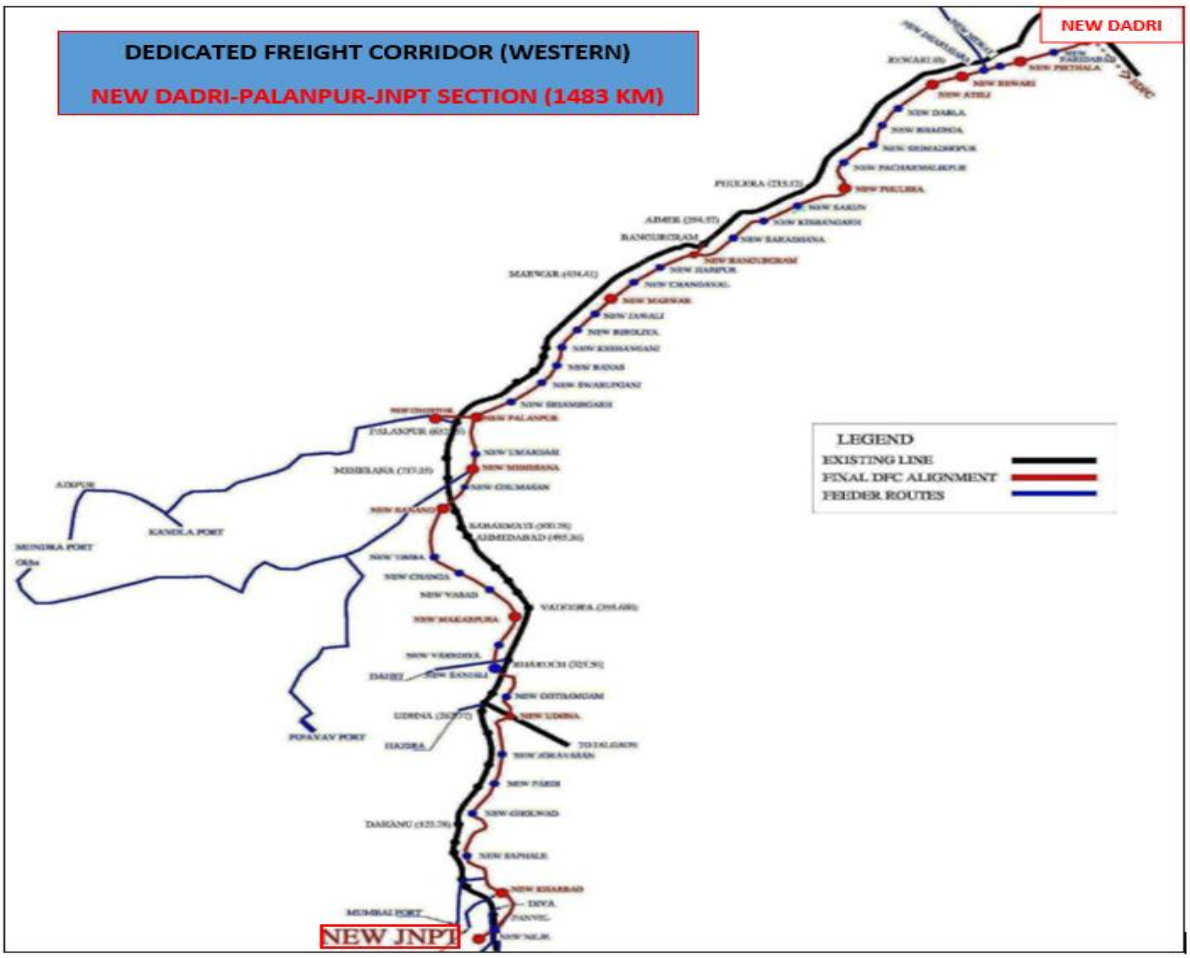
1.6 Western Dedicated Freight Corridor (WDFC) – JNPA to Dadri

Government of India had established the Dedicated Freight Corridor Corporation of India (DFCCIL) on 30 October 2006 aimed at decongesting Indian Railways network by moving 70% of Indian Railways freight train by constructing two corridors viz Western Dedicated Freight Corridor (Western DFC) from Dadri in Uttar Pradesh to Navi Mumbai in Maharashtra and Eastern Dedicated Freight Corridor (Eastern DFC) from Ludhiana in Punjab to Dankuni in West Bengal via Khurja in Uttar Pradesh.

Western Dedicated Freight Corridor (WDFC) runs parallel to the existing trunk route of Western Railway on its East side in the project area. WDFC would facilitate the movement of container traffic between the ports situated on the west coast and ICDs located in Northern India, especially Tughlakabad, Dadri and Dandharikalan. Western DFC is expected to cover a distance of 1483 KM of double line electrified (2 X 25KV) track extending from JNPA Port to Dadri via Surat – Vadodara – Ahmedabad - Palanpur - Rewari. It would also ease the movement of other bulk commodities like Fertilizers, Food grains, Salt, Coal, Iron & Steel and Cement on the western corridor. Further, to use the corridor efficiently many logistic parks are proposed along Western DFC. Feeder routes taken for up-gradation by IR exclude the rail network/sections developed by non-IR agencies such as Kutch Railway Company Limited (KRC) and Pipavav Rail Corporation Limited (PRCL).

The sketch indicating the proposed Rail connectivity of WDFC (JNPA to Dadri) is placed below:

Figure 1-4 Western Dedicated Freight Corridor



1.6.1 Salient features of the WDFC

The salient features of the WDFC are indicated below:

Table 1-1, Salient Features of WDFC

Features	Western Dedicated Freight Corridor
Route Description	JNPA -Ahmedabad-Palanpur-Rewari-Tughlakabad-Dadri
Route Kilometre	1483
Signalling Arrangement	Automatic Signalling with 2 KM spacing on Double line
Traction	Electrified (2 x 25 KV AC) High rise
Speed	100 KMPH
Ruling Gradient	1:200

1.7 Western Railway Line (Mumbai – Delhi)

Mumbai-Delhi electrified double main line section falling in Mumbai Central (BCT) Division of Western Railway is the nearest Indian Railways network in the project area. Government of India (GoI) has approved to upgrade the existing Mumbai-Delhi route to 160 KMPH speed potential. This includes the Mumbai - Vadodara stretch as well. The project is expected to be completed by FY: 2023-24.

Over the next few years, Indian Railways aims to eliminate wait-listed tickets on heavily congested railway routes and Mumbai-Delhi route is one of them. Western Dedicated Freight Corridor is expected to be fully commissioned by the end of 2024, hence taking a big percentage of the freight traffic away from the congested Mumbai-Delhi route and allowing passenger trains to run at faster speeds on Mumbai-Delhi route.

1.8 MRVC Local Line (Virar - Dahanu Road)

Greater Mumbai Area is expanding towards Virar and beyond. Many large and medium scaled industries have come up between Virar and Dahanu Road due to comparatively cheaper land. To meet the mobility requirements, Indian Railways (IR) and Government of Maharashtra (GoM) through Mumbai Rail Vikas Corporation (MRVC) Ltd., Metropolitan Regional Development Authority (MMRDA) and the World Bank (WB) have planned a comprehensive investment scheme for improving and expanding the transportation network of Mumbai, through Mumbai Urban Transport Project (MUTP). In this regard, Mumbai Rail Vikas Corporation (MRVC) in Phase – III of MUTP has sanctioned the proposal of commissioning the suburban rail services up to Dahanu Road by expanding the capacity and introducing 3rd and 4th lines. MRVC has appointed M/s RITES Ltd to undertake the feasibility study of constructing the additional lines for operation of suburban services.

1.9 About M.R. Technofin Consultants Pvt Ltd

M. R. Technofin Consultants Pvt Ltd. is a leading international consulting company which is in the specialized business of providing engineering solutions for Railway Projects, Road Projects, Multi Modal Transport Projects, Port Development, and all other Civil and Social Infrastructure Projects.

M. R. Technofin Consultants Pvt Ltd is an ISO 9001:2015 Certified Company, possesses multi-disciplinary consulting capability and a vibrant organization staffed & associated by eminent, experienced and qualified professionals which include Railway Infrastructure Experts, Railway OHE Experts, Railway S&T Experts, Railway Electrification Experts, Railway Traffic & Operations Experts, Railway Track Experts, Rolling Stock Experts, Logistics Experts, Port Experts, Structural Experts, Hydrology Expert, Geotechnical Experts, Environmental Experts, Road Design Engineers, Highway Engineers, Social and Resettlement Experts, Economists and Financial Experts. Our strategy is an integrated approach to planning, particularly for projects, which have multi-disciplinary ramifications.

1.10 Registration of M. R. Technofin Consultant Pvt Ltd. on DFCCIL

M.R. Technofin Consultants Pvt Ltd (MRTCPL), G-57, Kailas Industrial Complex, Parksite, Vikhroli, (West) Mumbai – 400079, is an 'Approved Consultant on DFCCIL' for providing consultancy services for Railway Siding/connectivity.

1.11 Authority of the Assignment

JNPA has appointed **M.R. Technofin Consultants (Approved Consultant on Western Railway & DFCCIL)** *(through M/s Royal Haskoning DHV (RHDHV) India)* to provide consultancy services **for Development of Railway Connectivity to 'Greenfield Vadhvan Port', located at Tal: Dahanu, Distt: Palghar (Maharashtra).**

1.12 Objective of the Assignment

The broad objective of this consultancy assignment is to carry out Techno-Economic Feasible Assessment, preparation and obtaining necessary approvals for Feasibility Study Report, Detailed Project Report and Engineering Scale Plan for **Development of Railway Connectivity to 'Greenfield Vadhvan Port', located at Tal: Dahanu, Distt: Palghar (Maharashtra).**

1.13 Scope of Work

The specific scope of the consultancy services is:

- Reconnaissance Survey
- Submission of Draft Feasibility Report to JNPA
- Submission of Feasibility Report to DFCCIL
- Obtaining 'In Principle Approval (IPA)' from DFCCIL
- Detailed Topographic Survey
- Submission of Draft Detailed Project Report and Engineering Scale Plan to JNPA
- Submission of Detailed Project Report and Engineering Scale Plan to DFCCIL
- Approval of Detailed Project Report & Engineering Scale Plan from DFCCIL

1.14 Submission of Feasibility Study Report to DFCCIL

Feasibility Study Report (FSR) for proposed Railway Connectivity to Vadhvan Port from proposed New Palghar station of Western Dedicated Freight Corridor (WDFC), was submitted to DFCCIL on 06.03.2023.

1.15 Purpose of this Final Detailed Project Report

This Final Detailed Project Report (DPR) provides detailed study of the proposed Railway Connectivity to Vadhvan Port from proposed New Palghar station of Western Dedicated

Freight Corridor (WDFC), crossing over the Indian Railways corridor of Western Railway, the proposed Mumbai Rail Vikas Corporation (MRVC) lines as well as WDFC lines.

The purpose of this report is to present the following:

- Detailed study of Railway Connectivity to Vadhvan Port from New Palghar station
- Study of Take-off Arrangements and Modifications at New Palghar station
- Define Operational system and various infrastructure requirements for railway connectivity
- Prepare Engineering Scale Plan of Layout
- Prepare Detailed Cost Estimate

1.16 Structure of this Feasibility Report

The structure of this report is organized as follows:

Executive Summary

Chapter -1: Introduction & Background

Chapter -2: Field Survey

Chapter -3: Traffic Projection

Chapter -4: Characteristics of Project Area

Chapter -5: Details of Serving Station

Chapter -6: Project Engineering

Chapter -7: System of Operation

Chapter -8 Signal & Telecommunication

Chapter -9: Electrical

Chapter - 10: Commercial

Chapter - 11: Mechanical

Chapter -12: Standards of Construction

Chapter -13: Detailed Cost Estimate

Chapter- 14: Annexures

Chapter -14: Drawings

Appendices

2 Field Survey

2.1 Field Survey

Reconnaissance survey was carried out in October 2022 covering the entire area of the proposed Rail connectivity from the Vadhvan Port to New Palghar Station of WDFC.

Detailed Topographic Survey by DGPS & Total Station of the complete alignment via RFO/ROR from New Palghar station to Last Dead end of Vadhvan Port yard, was carried out in March 2023.

Topographic Survey for area of west of MRVC line up to proposed entry & Port yard was carried out by JNPA. Topographic survey for area east of WDFC Main line & RFO/ROR was carried out by MRTCPL.

The investigation included identification of water courses, road crossings, power transmission lines, existing Western Railway line, under construction New Palghar station yard of WDFC & MRVC Line and location of take-off point.

The area between Serving station (New Palghar Station) and the proposed In-Port yard is mostly plain and removal of some bushes & shrubs was required to enable the team to carry out the survey.

Based on the field particulars obtained, the take-off point of the siding of Vadhvan Port has been proposed.

Reference Point: The chainages for the proposed railway connectivity of Vadhvan Port are reckoned by considering the **Centre line of New Palghar Station as "Zero Chainage"**. Few Photographs of Project Area is pasted below**:**

Figure 2-1, Photographs of Project Area

3 Characteristics of Project Area

3.1 Characteristics of Project Area

The following are the details of the site and few of the characteristics of the project area.

3.1.1 Vadhvan Port Location:

- The proposed port is located at Vadhvan near Dahanu, abutting northern boundary of Palghar district of Maharashtra at co-ordinates Latitude 19°55.8'N and Longitude 72°39.6'E. Vadhvan Port site has natural and strategic advantages.
- From Physical Features perspective, it is 'Flat terrain' with no natural obstruction.
- The Port is about 12 KM from Vangaon Railway Station of Mumbai- Delhi Western Railway route and about same distance from New Palghar crossing station of Western Dedicated Freight corridor which runs parallel to Mumbai -Delhi Western Railway Main line in the same corridor.
- The port location is on the west side of existing Mumbai –Delhi Railway line (Indian Railway) Main line. Hence, Vadhvan port is located on the opposite side of WDFC.

The port location is placed below as **Figure 3-1:**

Figure 3-1, Location of Project area

3.1.2 Proposed Rail Connectivity from New Palghar Station to Vadhvan Port

- After take-off, the proposed main/lead double line of Vadhvan Port starts from New Palghar Station of WDFC (Ranishigaon Village).
- The main/lead double line takes a turn on southeast side and proceeds towards Proposed Holding yard of Vadhvan Port.
- After the holding yard of Vadhvan Port at New Palghar Station at Saphale end, the proposed main/lead double line will run for approximately 7 KM and cross over the DFCC

main lines, IR lines, and proposed MRVC lines through Rail Fly Over (RFO)/Rail Over Rail (ROR).

- After the RFO/ROR, the proposed main/lead double line will further proceed towards Vadhvan Port and will run approximately 11 KM. and enter into the Vadhvan port, where facilities have been proposed for the loading and unloading of container rakes, the loading of LPG rakes, and the loading of Fertiliser rakes.
- The proposed main/lead double line crosses Hanumannagar, Shigaon, Nevale & Newale, Kolavali, Tanashi, Bavade, Chinchani, and Varor villages.

3.1.3 Climate, Rainfall, Temperature, Relative Humidity, Cyclone

The average annual rainfall in the project area is 1163 mm with the total number of rainy days being 51 days per year. June to August is the wettest months of the year with an average rainfall in excess of 274 mm per month, with a maximum of 451 mm in July 2005 during the southwest monsoon period. February and March are dry months with average rainfall below 1 mm per month.

The mean daily maximum temperature is 31°C and with 34°C the highest occurring in April. Mean daily minimum temperature is 24°C and with 18°C the lowest occurring in December.

Relative humidity is generally high and rises to about 85% during the monsoon.

Throughout the year visibility is good as the region has zero fog days. However, during rains and squalls, the visibility deteriorates.

3.1.4 Seismic Zone

Vadhvan Port site is in Zone IV of Indian Map of Seismic zones (IS-1893 Part-1 2002) which is a moderate risk seismic intensity zone.

3.1.5 Religious edifices etc

Based on the survey for project area, every endeavour has been made to avoid interference with religious edifices, burial grounds or other places or objects which are considered sacred. Similarly, all possible steps have been taken to avoid interference with and prevent the destruction of ancient remains of archaeological interest.

4 Traffic Assessment

4.1 Traffic Projection (Phase-1)

JNPA has proposed to set up a new port at Vadhvan as a 'Major Port'. The upcoming Vadhvan port will consist of Container/Liquid/ Multipurpose Cargo Terminals within the port. Vadhvan Port envisages to handle of Container, LPG and Fertilizer traffics through rail as well as road within the port.

Majority of the traffic to be handled at the port will be 'Container traffic'. On WDFC, container rakes will be of 'Long haul' length with 'Double Stack Containers' on each BLC wagon (total-90 wagons). Hence, carrying capacity of each 'Double Stack BLC rake of WDFC' will be 360 TEUs (2x2x90).

The traffic projection for Phase-1 is placed below as **Table 4-1:**

Table 4-1, Traffic Projection of Rail (Phase-1)

Year	'EXIM' Container Rakes (Inward & Outward)	LPG Rakes (Outward)	Fertilizer Rakes (Outward)	Total Rakes Per Day
2030	34	3	1	38

[Source: Data received from M/s Royal Haskoning DHV]

Note: The traffic assessment for the Vadhvan port has been separately studied by the lead consultant of Port project i.e., M/s Royal HaskoningDHV.

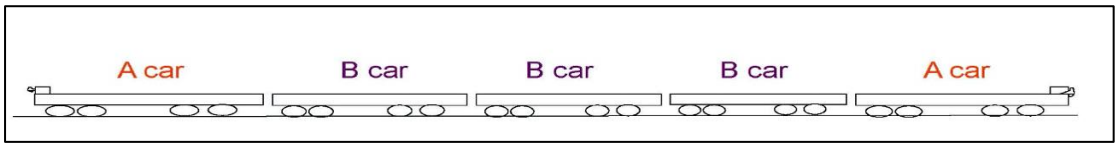
4.2 Detail of Wagons

4.2.1 BLC Wagon:

On Indian Railways, containers are transported in 'BLC' type of wagons. BLC specifies 'Bogie Low platform Container'. The wagons come in two types as 'A' and 'B'. Both these types are joined/coupled in the combination of: A+B+B+B+A to form One Unit. The existing each container (BLC) rake on Indian Railways consists of about 9 Unit (total- 45 BLC wagons). Each BLC wagon can carry 2 TEUs in 'Single Stack' mode. Each 'Single stack BLC rake (Conventional Container Rake) of Indian Railways' can transport 90 TEUs (2x45). **On WDFC, container rakes will be of 'Long haul' length with 'Double Stack Container' on each BLC wagon (total- 90 wagons). Hence, carrying capacity of each 'Double Stack BLC rake of WDFC' will be 360 TEUs (2x2x90).**

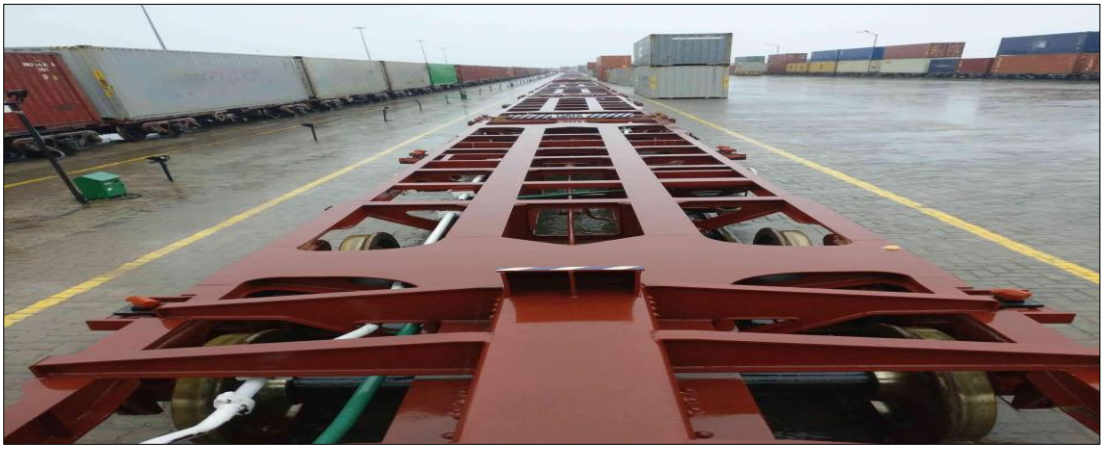
The combination of one set of BLC wagon is shown below as **Figure 4-1:**

Figure 4-1, Combination of BLC Wagon to form One Unit



The image of BLC wagon is placed below as **Figure 4-2:**

Figure 4-2, BLC Wagon



- Specification of BLC wagon is placed below as **Table 4-2:**

Table 4-2, Specification of BLC Wagon

Tare	'A' Car- 19.10 T 'B' Car-18.0 T
Payload	61 T
Axle load	20.32 T
No. of Wagon Per Rake	45

Length of 'A'Car-13.625M & 'B' Car-12.212M. Total Length of Each Unit-69M

Floor Height from Rail Level- 1.009M

4.2.2 BTPGLN Tank Wagon:

LPG is transported in BTPGLN (Bogie Tanker Petroleum Gas Frameless Pneumatic brake) wagons.

The image of BTPGLN Tank Wagon is placed below as **Figure 4-3:**

Figure 4-3, BTPGLN Wagon

Specification of BTPGLN Tank Wagon is placed below as **Table 4-3:**

Table 4-3, Specification of BTPGLN Wagon

Tare	41.6 T
Payload	37.6 T, 79.4m^3 (Volume)

Axle load	20.3 T
No. of Tank Wagon Per Rake	32

Length over couplers- 18.9M, Width- 3.05M, Height- 4.29M & Inside diameter- 2.4M

4.2.3 BCNHL Wagon

'Fertilizer' is transported in BCNHL (Bogie Covered Pneumatic Brake and Higher Load) Wagons. BCNHL wagons is used primarily for bagged commodities like cement, fertilizer, food grain etc.

The image of BCHNL wagon is placed below as **Figure 4-4:**

Figure 4-4 , BCHNL Wagon

- Specification of BCHNL wagon is placed below as **Table 4-4:**

Table 4-4, Specification of BCHNL Wagon

Tare	20.8 T
Payload	70.8 T
Axle load	22.9 T
No. of Wagons Per Rake	58

Length over couplers- 10.963 M, Width- 3.405 M & Height-4.305 M.

5 Details of Serving Station

5.1 New Palghar Station of WDFC

New Palghar station of WDFC is a "B" class station, which is presently 'under construction'. New Palghar station is situated on Vaitarana– Sachin 'Electrified' Double line section of Western Dedicated Freight Corridor (WDFC) at KM. 141+490. Standard-III Electronic Interlocking (EI) with 4 Aspect Multiple Aspect Colour Light (MACL) signalling is provided at this station, which are controlled from 'Central Panel' located at the station.

New Palghar station will be the 'Serving Station' for Railway connectivity for upcoming Vadhvan Port.

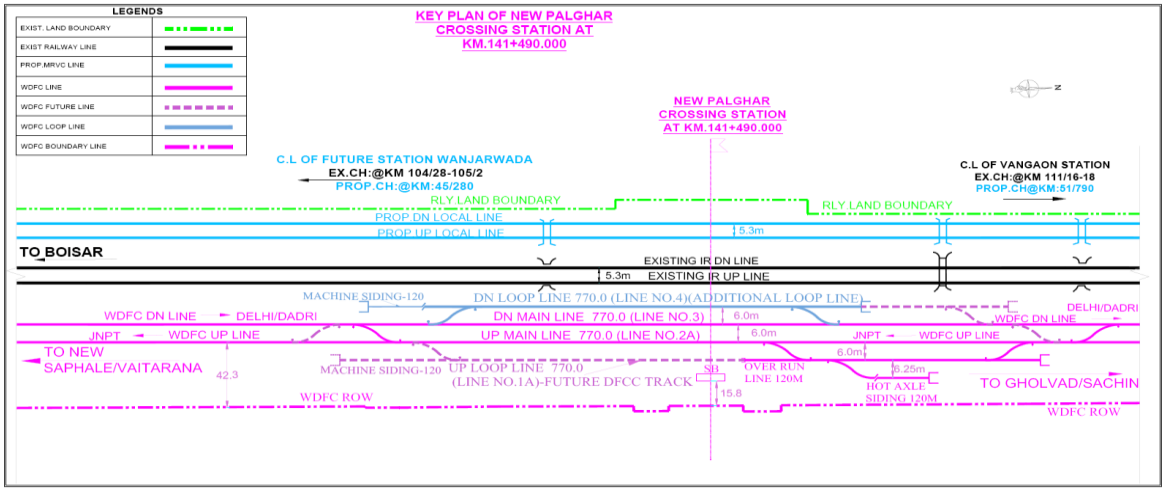
The details of New Palghar station are shown below as **Table 5-1:**

Table 5-1, Details of New Palghar Station of WDFC

Sr. No.	Description	CSR (M)
1	UP Loop Line, Future Line (Line No. 1A)	770
2	UP Main Line (Line No. 2A)	770
3	DN Main Line (Line No. 3)	770
4	DN Loop Line (Line No. 4)	770
5	Hot Axle Siding	120
6	Machine Siding	120
7	Machine Siding (Future)	120
8	Platform (150 m x 6 m)	**01 o.**

The layout of New Palghar Station (under construction) is placed below as **Figure 5-1:**

Figure 5-1, New Palghar Station



During the reconnaissance survey few captured photographs of New Palghar Station are placed below as **Figure 5-2:**

Figure 5-2,Photographs of New Palghar Station

	
Under Construction Track in DFC Yard Area	**New Palghar Sub-Station**
	
Side drain along the track in the DFC yard	**Under construction Station Building at DFC New Palghar**

6 Project Engineering

6.1 Rail Connectivity to Vadhvan Port

JNPA has proposed to set up a new port at Vadhvan as a Major Port. Vadhvan Port envisages to handle Container, LPG and Fertilizer traffic through rail within the port.

The nearest railway station of WDFC to Vadhvan Port is New Palghar crossing station, which runs parallel to Mumbai -Delhi Main line of Western Railway. WDFC is passing parallel to the existing Western Railway Main Line on east side. Vadhvan Port is located on west side of existing Mumbai –Delhi Main line as well as the proposed WDFC. Hence, Vadhvan port is located on opposite/other side of WDFC.

New Palghar station of WDFC will be the 'Serving Station' for Railway connectivity for upcoming Vadhvan Port.

Railway Connectivity from Vadhvan Port to New Palghar station of WDFC is 'feasible' only by crossing proposed WDFC Main lines, existing WR Main lines & proposed MRVC lines by a 'Rail Fly Over (RFO)/ Rail-Over-Rail (ROR)'.

Hence, for connectivity of Vadhvan Port to WDFC, it is imperative to cross the WR Main line/WDFC Main Line/MRVC Lines by a Railway Fly Over (RFO)/ Rail Over Rail (ROR).

WDFC is creating facilities at New Palghar station to accommodate 'Long haul container rake'.

Vadhvan Port traffic arriving at New Palghar station will have connectivity to In-Port yard through RFO/ROR.

In this report, the Railway connectivity of Vadhvan Port has been described in the following segments:

i) Junction Arrangement at New Palghar station

ii) Alignment from Holding yard to RFO/ROR

iii) Alignment from RFO/ROR to Port Gate

iv) RFO/ROR

v) In-Port yard

6.2 Junction Arrangement at New Palghar station for Take-off of Vadhvan Port connectivity

- The detailed layout of Junction Arrangement at New Palghar station for Railway connectivity of Vadhvan Port is enclosed as Drawing: D1.
- A Dead End at WDFC CH: 140+ 497.500 is proposed at New Saphale end of Future UP Loop line No.1A of New Palghar station by WDFC. This Dead end is proposed to be dismantled for Railway connectivity of proposed Vadhvan Port.
- Railway connectivity of proposed Vadhvan Port is taking off from Dismantled Dead End of Future UP Loop Line No.1A by a proposed De-railing Switch (DS) at WDFC CH:992.50 (F/CSB) at New Saphale/JNPA end of New Palghar station.
- After the Take-off, insertion of 1:12 New Crossover between WDFC UP Main Line and Extended Future UP Loop Line No.1A at New Palghar station.

- A 'Holding yard' for handling Vadhvan Port is proposed near to / connectivity from New Palghar station.
- Insertion of 1:12 New Crossover Between Loop Line No.1 of Holding yard and WDFC UP Main Line for direct reception of VPPL rake, by-passing the Holding yard.
- Insertion of 1:12 New Crossover Between WDFC UP Main Line to WDFC DN Main Line for direct dispatch of VPPL rake, by-passing the Holding yard.
- Insertion of 1:12 New Crossover between proposed DN Main Line of VPPL and WDFC UP Main Line at New Saphale end for dispatch of VPPL rake to New Saphale/JNPA side.

6.3 Railway Alignment of Vadhvan Port from Holding yard to RFO/ROR

- Railway connectivity of proposed Vadhvan Port is taking off from Dismantled Dead End of Future UP Loop Line No.1A by a proposed De-railing Switch (DS) at CH:992.50 (F/CSB of New Palghar) at New Saphale end of New Palghar station.
- After take-off, the alignment moves straight towards New Saphale end upto SRJ No 3 at CH:1228.26, crossing an existing WDFC RUB at CH: 1079.41. Extension of this RUB by a RCC BOX (Br.No.1) is proposed.
- A 1:12 Crossover is proposed between DFC UP Main line (SRJ No.1 at CH: 1105.04) & the alignment (SRJ No.2 at CH: 1213.26), as an additional facility for reception/dispatch of Vadhvan Port traffic from/to DFC Main line.
- At SRJ No.3, a 1:12 Cross over is proposed to connect the alignment to Line No.5 of proposed 'Holding Yard' of Vadhvan Port. Through this crossover, the alignment exists DFC ROW at CH: 1350.
- 120m long Over Run Line (ORL) is proposed from SRJ No. 3 within DFC ROW on the alignment for isolation of Vadhvan Port traffic moving from New Palghar station to Holding yard. Dead end of this ORL is proposed at CH: 1380.216.
- Holding yard is proposed adjacent to DFC ROW in 'Private Land' and consists of Eight (8) lines. The detail of lines of Holding yard is placed below as **Table 6-1:**

Table 6-1, Details of Holding Yard

Sr. No.	Details	CSR (M)
1	Loop Line No.1	1680.88
2	Loop Line No.2	1727.37
3	Loop Line No.3	1723.91
4	Loop Line No.4	1723.91
5	Loo Line No.5 (Vadhvan UP Main/ Lead line)	1839.608
6	Loo Line No.6 (Vadhvan DN Main/ Lead line)	1693.967
7	Loop Line No.7	1549.696
8	Loop Line No.8	1500

- Cabin 'A' is proposed at Centre Line of Holding yard at CH: 2600.00 to control operation of Vadhvan Port traffic from Holding yard to Cabin 'B', located on the west side of RFO/ROR.
- The location of Holding yard will require provision of Minor Br.No.2 (Nalluh-RCC BOX), Minor Br.No.3 (Nallah-RCC Slab), Road crossing Br.No.4 (RUB-RCC BOX), Minor Br.No.5 (Nullah-RCC BOX). It will also require Re-location of Foundation of 2 Nos HT lines.
- Line Nos.5&6 of Holding yard proceeds as Vadhvan UP & DN Main/Lead lines ('Double line') with Inter-Track distance of 6.0 m towards South side upto CH:4140.19.
- A 1:12 Crossover is proposed between Line No.5 (SRJ No.19 at CH:4094.158) and Line No. 6 (SRJ No.20 at CH:4109.158). Another 1:12 Crossover is proposed between Line No.6 and DFC UP Main line. These crossovers will facilitate direct movement of Vadhvan Port traffic from Holding yard to DFC UP Main line towards New Saphale station.
- At CH:4140.19, the alignment negotiates Curvature No.1 (3.5 degree) for UP line and Curvature No.2 (3.6 degree) for DN line, to move towards East side for by-passing Village: 4750.00 and ends at CH: 4938.68.
- The alignment proceeds further straight upto CH:5248.87 to cross Road Br. No.6 (R0B-RCC BOX) and from there negotiates Curvature Nos 3 &4 (2 degree each) to end at CH:6147, to move towards North side.
- The alignment proceeds straight upto CH:7441.23 to cross Road Br.No.7 (RUB- RCC BOX) and from there negotiates Curvature Nos 5 & 6 (2 degree each) to end at CH: 8549.67 to cross Road Br.No.8 (ROB-RCC BOX), to move towards West side.
- The alignment proceeds further straight upto CH:10711.29 to cross Road Br. No.9 (R0B-RCC BOX), Road Br. No.10 (RUB-RCC BOX), Canal Major Br. No.11 (PSC Slab) & Road Br. No. 12 (RUB-RCC BOX).
- From there, the alignment further negotiates short Curvature Nos 7 &8 (1degree each) upto CH: 10761.12 and Curvature Nos 9 &10 (1 degree each) from CH: 10825.81 to 10875.10 to maintain Inter -Track distance of 12.5 on proposed RFO/ROR Br.No.14.
- The alignment further proceeds straight over the RFO/ROR from CH: 10875.10 to 11534.38, crossing the Main lines of WDFC, WR and MRVC at Skew Angle of 43 degree. It crosses Canal Major Br.No.13 (PSC Slab).

6.4 Railway Alignment of Vadhvan Port from RFO/ROR to Port Gate

- From RFO/ROR,the alignment further negotiates short Curvature Nos 11 &12 (1degree each) upto CH: 11582.43 and Curvature Nos 13 &14 (1 degree each) from CH: 11652.25 to 11700.23, to maintain Inter -Track distance of 6.0 m between Main lines ('Double line') of the alignment.
- Cabin 'B' is located on the south side of the alignment after crossing RFO/ROR at CH: 11700.23. This will control operation of Vadhvan Port traffic from Cabin 'B' to Port Gate, located at CH: 22225.00.
- After crossing the RFO/ROR, the alignment proceeds towards North west to reach Port Gate. The alignment requires to cross few nullahs and large number of roads to reach Port Gate.

- Main/Lead Double Line (alignment) of Vadhvan Port from Take-off to Port Railway Gate of In-Port yard will be on 'Private Land'.
- Main/Lead Double line of Vadhvan Port crosses Hanumannagar, Shigaon, Nevale & Newale, Kolavali, Tanashi, Bavade, Chinchani, and Varor villages.
- The list of **Curvatures from Cabin 'B' near RFO/ROR to Port Gate** are listed below as **Table 6-2:**

Table 6-2, List of Curvatures from Cabin B to Port Gate

List of Curvatures			
Sr. No.	**Curve No.**	**CH:**	
		From	**To**
1	15	11959.52	12042.75
2	16	11959.74	12042.99
3	17	12383.44	12509.63
4	18	12383.32	12509.51
5	19	12812.58	12920.25
6	20	12812.51	12920.18
7	21	14121.48	14335.39
8	22	14121.09	14335.00
9	23	14849.33	15059.72
10	24	14850.22	15059.72
11	25	16222.35	16456.11
12	26	16222.28	16456.03
13	27	19080.06	19375.99
14	28	19080.40	19376.47
15	29	20061.47	20841.12
16	30	20062.32	20841.97
17	31	21551.22	21665.29
18	32	21550.51	21664.58
19	33	21933.57	22201.92
20	34	21933.93	22202.28

Note: Curvatures: - 12 Nos. = 1.75 degree (R=1000), 02 Nos. = 2.18 degree (R=800), 04 Nos. = 1.0 degree (R=1750) and 02 Nos. = 2 degree (R=875)

- The list of **Bridges for crossing Roads & Nullahs from Cabin 'B' near RFO/ROR to Port Gate** are listed below as **Table 6-3:**

Table 6-3, List of Bridges from Cabin B to Port Gate

List of Bridges			
Sr. No.	**Bridge No.**	**CH:**	**Type of Crossing**
1	15	From CH: -12236.55	Nullah
2	16	To CH: -21953.00	Nullah
3	17		Road (RUB)
4	18		Road (RUB)
5	19		Road (RUB)
6	20		Road (RUB)
7	21		Road (RUB)
8	22		Road (RUB)
9	23		Road (RUB)
10	24		Road (RUB)
11	25		Road (RUB)
12	26		Road (RUB)
13	27		Road (RUB)
14	28		Road (RUB)
15	29		Road (RUB)
16	30		Road (RUB)
17	31		Road (RUB)
18	32		Nullah
19	33		Road (RUB)
20	34		Road (RUB)

Note: All the Bridges are of RCC BOX each.

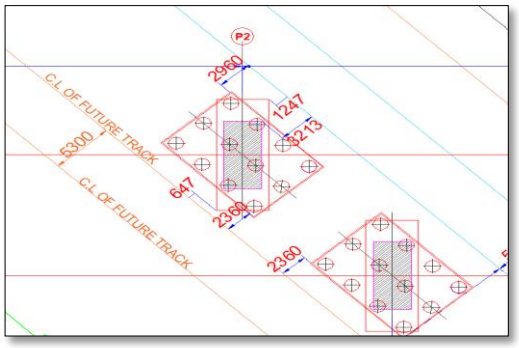
6.5 Provision of Rail Fly Over (RFO)/Rail Over Rail (ROR) at CH:11294.71

M.R. Technofin prepared a separate 'FSR for RFO/ROR' which was submitted by JNPA to DFCCIL vide letter no. PPD-1 Rail Connectivity/VPL/2022/1171 dated: 09.12.2022. DFCCIL had given comments on the FSR for RFO/ROR vide their letter no. MUM/N/EN/Vadhvan Port/Vangaon/778 dated:28.12.2022. The Consultant prepared the response and submitted it to DFCCIL vide letter no. MRTCPL/20038/JNPA/Vadhvan/RFO/DFR/01 dated: 05.01.23. Further, DFCCIL vide letter No. MUM/N/EN/Vadhvan Port/Vangaon/778 dated:07.02.2023, has **'accepted the compliance'.** The Copy of the Letter is attached as Annexure in section **14.4 DFCCIL Letter Concerning ROR.**

In this **'FSR for RFO/ROR'**, M.R. Technofin studied Four (4) options for RFO/ROR viz Option No.1A, Option No.1B, Option No. 2A and Option No.2B at the preliminary assessment stage considering the location, provision of longer spans and orientation of the substructure. Out of Four (4) options, **Option No.2B has been recommended**. The salient features of Option No.2B are summarized below.

6.5.1.1 Option 2B: Considers No Pier in between Track, Uses Long Main Span Girder and Pile Cap of Pier (P2) parallel to the Existing Tracks, Pier and Pier cap (P2) Perpendicular to the RFO/ROR Track

Pier Cap: The pier cap length of 11.5 m and having a width of 4.15 m has been considered. The pier has been kept perpendicular to the RFO/ROR track as has been kept for Option 2A. The distance from centre of MRVC line & pier cap edge is 1.2 m. Thus, the height of pier cap will be provided above limiting MMD so that it does not infringe.



Pier: The pier adjacent to the MRVC lines has wall type pier as shown in the adjacent figure. As shown in adjacent figure, the wall type pier does not infringe and the dimensions of the pier are within the IR SSOD limit.

Pile Cap: The pile cap of pier P2, adjacent to MRVC lines is about 2.960 m from centre of MRVC line. The construction of piles and pile cap would require to be done under very close supervision for the portion which is close to the MRVC lines. However, this option has enough space on the west side to provide for construction equipment etc.

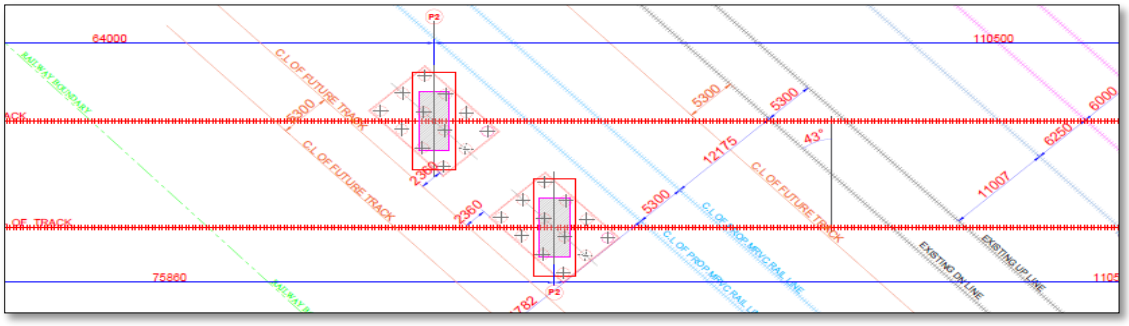
This option 2B utilises railway land effectively.

To avoid additional piers in railway corridor, 61.0/ 72.86/ 49.14 m (clear span) open web girder has been proposed. Due to pile cap being parallel the track, it saves the usable space for the future expansion of railway lines along MRVC line and WR lines. As per the Western DFC SSOD, Centre to Centre of track between DFC line and existing IR line should be 6.0 m.

Option 2B, could have three additional tracks for future development in between tracks as follows:

- Two tracks between west side boundary of Western Railway to the proposed pier location
- One track in between existing WR DN mainline & proposed MRVC line
- The sketch of option 2B is placed below as **Figure 6-1 :**

Figure 6-1, Sketch of Option-2B



The option 2B has been prepared, with spanning arrangement (overall girder length) as follows:

- Down Line - 1 X 32.45 m + 1 X 63.7 m + 1 X 110.4 m + 1 X 63.7 m + 1 X 32.45 m = **302.7 m.**

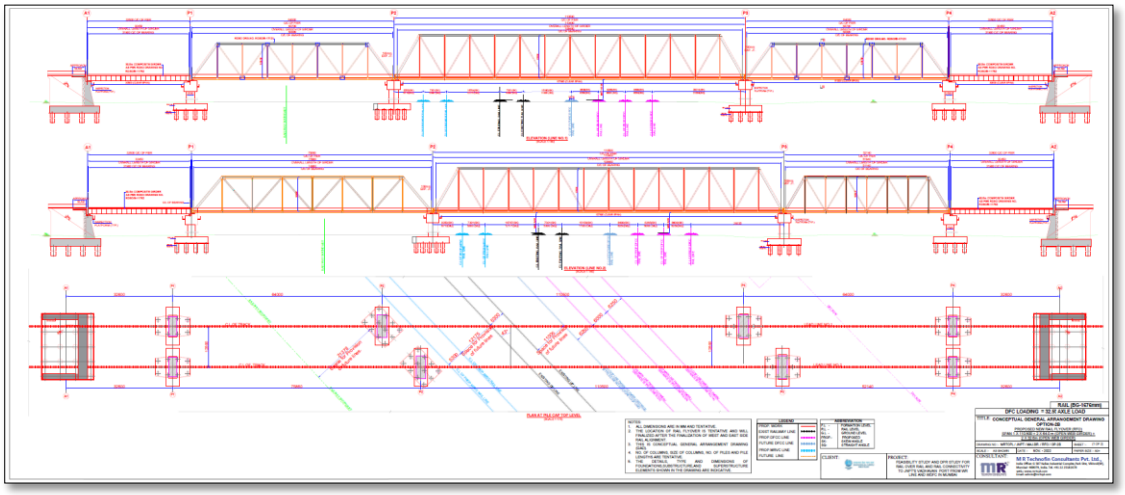
- Up Line - 1 X 32.45 m + 1 X 75.56 m + 1 X 110.4 m + 1 X 51.84 m + 1 X 32.45 m = **302.7 m.**
- All girders would be straight.
- Proposed details of Option 2B is placed below as **Table 6-4:**

Table 6-4, Proposed details of Option 2B

Sr. No.	Component	Details proposed for Option 2B
1	Superstructure	Overall girder length of 110.4 m Open Web Steel Girder, 63.7 m open web girder , 32.45 m Composite Girder
2	Sub Structure	Pier Cap - Rectangular shape, 11.5X 4.15 m Pier- Rectangular shape, 7.0 m X 3.0 m Pile Cap – Rectangular shape, 10.5 m X 7.5 m Pile – Circular Shape of 1.2 m diameter, 12 piles
3	Bearing	As per RDSO Standards for 76.2 m , 61 m and 30.5 m clear span girder

- The proposed arrangement of option 2B is placed below as **Figure 6-2:**

Figure 6-2, Proposed arrangement of option 2B



NOTE:

- This preliminary assessment is based upon the available information and data. The details would change based on the final alignment.
- This GAD is only for railway portion. The actual length of the RFO might increase based on detailed design considerations. The length of approach ramps will depend on site conditions, need for additional spans for future requirements and accommodating railway ramp on the east and west side. The extension of DFC New Palghar yard might be needed.
- The geotechnical investigation details at the final locations of the Substructures of the RFO needs to be conducted after freezing the alignment.

The final freezing of the spanning arrangement of proposed RFO/ROR can only be done after discussions and consent of key stakeholders viz. DFCCIL and WR (incl. MRVC).

6.6 In Port Yard for handling Container, LPG and Fertilizer

- Vadhvan Port envisages handling of LPG, Fertilizer & Container traffic within Port yard. Separate Two yards are proposed to handle LPG/Fertilizer & Container traffic.
- Main/Lead Double line from RFO/ROR connects WDFC to Vadhvan Port Railway yard.
- After crossing Vadhvan Port Gate at CH: 22225.00, the Main/Lead Double line crosses Road Br. No.35 at 22380.79, proceeds straight to Container yard. From this main /lead double line, through SRJ No. 24 at CH:22268.67 & SRJ No.35 at 22377.67, a Double line connectivity is provided common for connectivity to LPG /Fertilizer yards.
- This double line common for LPG/Fertilizer yards negotiates Curvature Nos 35 &36 (4 degree each) at CH:22911.24 and bifurcates into two single lines by SRJ No.46 at 2243.62 for separate connectivity to LPG and Fertilizer yards.
- The connectivity to LPG yard negotiated Curvature Nos 37 & 38 (4 degree each) and ends at Dead End at CH: 24612.17.
- The connectivity to Fertilizer yard negotiated Curvature Nos 39 (3.5 degree) and ends at Dead End at CH: 24517.00.
- Container yard connectivity to last dead end of the container yard is divided into three groups viz Container Stabling yard, Approach Trestle & Container Handling yard.
- From Container yard connectivity by SRJ No.40 at CH:22578.54, Container Stabling yard starts and ends at CH:24662.17.
- After Container Stabling yard, further double line connectivity negotiates Curvature Nos 40 &41 (3 degree each) to cross sea by an Approach Trestle for Container Handling yard, to be constructed off shore by reclamation.
- The Approach Trestle starts at CH:24871.00 and ends at CH:27491.05 (2.616 KM)
- After Approach Trestle, the double line proceeds further to Container Handling yard. Container Handling yard connectivity starts by SRJ No.66 at CH:27543.66.
- Container Handling yard connectivity is divided into Three (3) clusters/groups. The connectivity to the Cluster Nos 3&2 negotiates Curvature Nos 42 & 43 (2 degree each) and Cluster No. 1 by Curvature No.44 (2.19 degree).
- The Container yard ends at 'Last Dead End' at CH:31585.84.
- The Route KM of Vadhvan Port connectivity from Take off at New Palghar station to Last Dead End of Container yard is 30.593 KM.

6.6.1 Container Yard

Container yard consists of the following:

- Container Stabling Yard from
- Approach Trestle for Container Handling yard
- Container Handling yard

6.6.1.1 Container Stabling Yard

Container Stabling yard is proposed near Port Gate for stabling of container rakes. The details of the Container Stabling line are placed below as **Table 6-5:**

Table 6-5, Details of Container Stabling Yard

Sr. No.	Details	CSR (M)
1	Stabling Line No.1	1500
2	UP Main Line No.2	1500
3	DN Main Line No.3	1500
4	Stabling Line No.4	1500

6.6.1.2 Approach Trestle for Container Handling yard

The proposed container terminals and multipurpose terminals will be catered with a common approach trestle. An offshore area is proposed to be reclaimed to facilitate the storage and yard operation for these terminals.

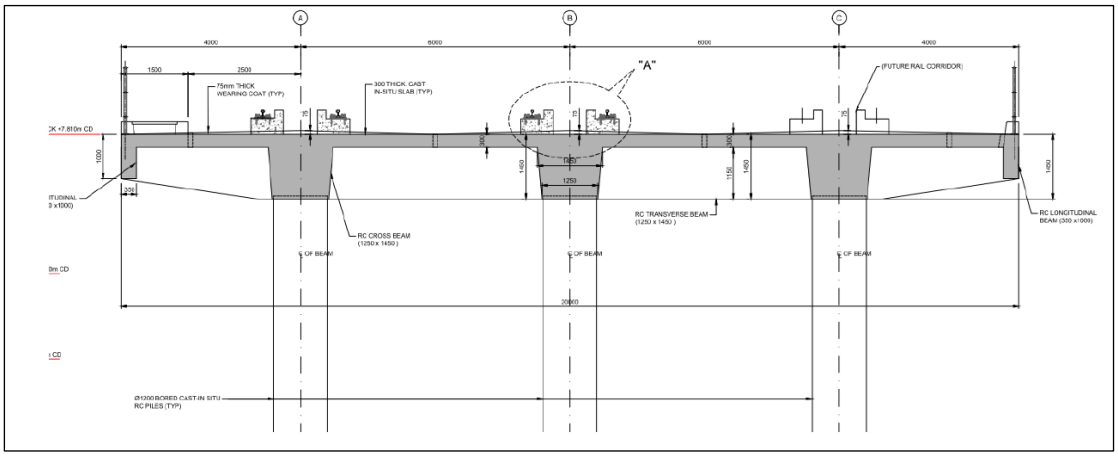
A trestle is proposed for the rail movement connecting the nearshore and offshore reclamation area where the rail yard will be located for container evacuation.

The proposed scheme consists of seven rows of bored cast-in-situ piles, spaced at 13 m c/c in the longitudinal direction. In the transverse direction, main beams are provided supported over the piles, which in turn support beams in the longitudinal direction. A 500 mm thick deck slab will be provided supported over the intermittent longitudinal beams. A 75 mm thick wearing coat will be provided over the RCC deck slab.

The Main/Lead Double line of VPPL inside Port yard after crossing Container Stabling Yard proceeds further on proposed **'Trestles'** for accommodating double line with future provision of 3rd line, for a length of about 2.616 KM to approach proposed Container Handling yard.

A typical cross section of approach trestle is placed below as **Figure 6-3:**

Figure 6-3, Typical Cross Section of Approach Trestle



6.6.1.3 Container Handling Yard

- Container yard is proposed to comprise of Three (3) groups (clusters) of railway tracks viz Group A, B & C. Each group comprises of Six (6) lines for Loading/Unloading of Container rakes and One (1) line as Sick line.
- Total No. of Lines: Eighteen (18) Container lines with CSR-1500 M each & Three (3) Sick lines with CSR-140 M each.
- Provision of a Sick Line of 140M long for each 'group' (cluster) has been made to take care of exigency of placement of Sick Wagons during day-to-day railway operations.
- The space between two group (clusters) of lines has been kept as 85.2 M to take care of adequate space for stacking of containers and provision of internal road for movement of container vehicles.
- The details of Lines of Container yard are described below as **Table 6-6:**

Table 6-6, Details of Container Handling Yard

Proposed Facilities at Container Handling Yard (In Port yard)				
Sr. No.	Cluster	Line No	Activity	CSR(M)
1	A	Line No. 1	Loading/Unloading	1500
		Line No. 2	Loading/Unloading	1500
		Line No. 3	Loading/Unloading	1500
		Line No. 4	Loading/Unloading	1500
		Line No. 5	Loading/Unloading	1500
		Line No. 6	Loading/Unloading	1500
		Line No. 7	Sick Line	140
2	B	Line No. 8	Loading/Unloading	1500
		Line No. 9	Loading/Unloading	1500
		Line No. 10	Loading/Unloading	1500
		Line No. 11	Loading/Unloading	1500
		Line No. 12	Loading/Unloading	1500
		Line No. 13	Loading/Unloading	1500
		Line No. 14	Sick Line	140
3	C	Line No. 15	Loading/Unloading	1500
		Line No. 16	Loading/Unloading	1500
		Line No. 17	Loading/Unloading	1500
		Line No. 18	Loading/Unloading	1500
		Line No. 19	Loading/Unloading	1500
		Line No. 20	Loading/Unloading	1500
		Line No. 21	Sick Line	140

6.6.2 Liquified Petroleum Gas (LPG)/Fertilizer Yard

- LPG yard has Four (4) lines for loading of LPG rakes, consisting of R&D line, loading line, engine line and dummy wagon line.

- Fertilizer yard has Four (4) lines for loading consisting of loading line, engine line, brake van line and sick line.

The details of Lines of LPG & Fertilizer yards are described below as **Table 6-7 & Table 6-8:**

Table 6-7, Details of LPG Yard

Proposed Facilities at LPG Yard			
SN	Line No.	Description	CSR (M)
1	Line No. 1	R&D Line	750
2	Line No. 2	Engine Line	750
3	Line No.3	Loading Line	750
4	Line No.4	Dummy Wagon Line	100

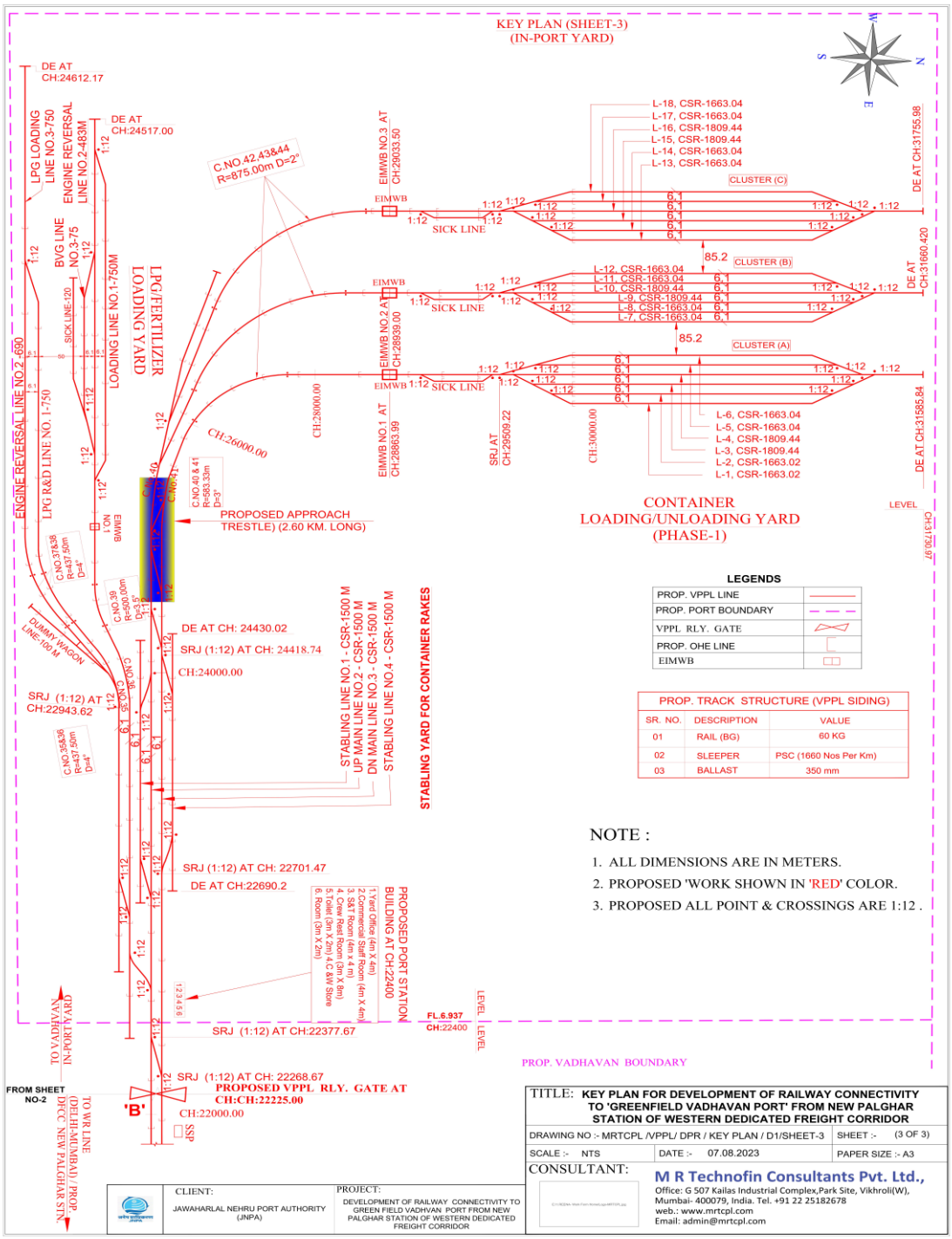
Table 6-8, Details of Fertilizer Yard

Proposed Facilities at Fertilizer Yard			
SN	Line No.	Description	CSR (M)
1	Line No. 1	Loading Line	750
2	Line No. 2	Engine Line	750
3	Line No. 3	Break Van Line	70
4	Line No. 4	Sick Line	120

6.6.3 In- Port Yard Layout

Following is the Conceptual layout of In-Port yard comprising of Container Handling yard as well as LPG/ Fertilizer yards. The Layout of In-Port Yard is placed below as Figure 6-4**:-**

Figure 6-4, In-Port Yard



6.6.4 Salient features of Railway connectivity

The salient features of Vadhvan Port's connectivity consisting of main/lead line, RFO/ROR & In-Port yard, are as follows:

- Route Length: 30.593 KM (From Take off at New Palghar station to Last Dead end of Container yard)

- Total Track Length: 136 KM (including In-Port yard)
- No. of Curvatures on lead line (From Holding yard to Proposed Port Railway Gate): 34 Nos. (Max. 2 Degree)
- No. of Curvatures inside Port yard (From Port Railway Gate to Dead end of Port Yard): 10 Nos (Max. 4 Degree)
- No. of Road Crossings: Total=25 Nos. (RUB – 23 Nos., ROB – 02 Nos.)
- No. of RFO/ROR: 01 No.
- Approach Trestle (2.616 KM long): 01 No. (Inside Port Yard)
- No. of Nullah/Canal crossing Bridges: Total = 9 Nos. (Major – 04 Nos., Minor – 05 Nos.)
- Four (4) Weighbridges are proposed inside the port yard by keeping level gradient and tangent length of 100 m each on either side.
- Provision of 'Cabin A' at Holding yard with Electronic Interlocking System
- Provision of 'Cabin B' near RFO/ROR with Electronic Interlocking System
- Provision of 'Port Station' with Electronic Interlocking System, consisting of Signalling Room with Central Panel, Crew Rest Room, FOIS Room etc.

7 System of Working

7.1 Proposal

New Palghar Station of WDFC is located on 'Electrifed' Vaitarana-Sachin section of WDFC at KM : 141+490, whis is under construction. New Palghar station of WDFC will be the serving station for the Vadhvan Port railway connectivity.

Proposed Vadhvan Port connectivity is taking off from Dead End of Future UP Loop Line No.1A by proposed De-railing Switch (DS) at CH:992.50 (F/CSB) at New Saphale/JNPA end of New Palghar station.

WDFC has proposed to introduce 'End of Train Telemetry system (EOTT)' in their Container rakes to run 'Without Guard'. Hence, no Brake-Van will be provided in Container rakes. However, LPG & Fertilizer rakes will include Brake-Van for Guard.

As per extant guidelines issued by Railway Board vide Rates Circular Demurrage-Wharfage-Waiver /2016/0, Permissible Free Time for loading and unloading of Container rake (Normal Single Stack rake of 90 TEUs) is 3.0 hours each.

Container traffic of Vadhvan Port will consist of 70% Double Stack Long haul rakes (360 TEUs each) & 30% Double Stack Normal rakes (180 TEUs).

Hence, permissible free time of double operation of container traffic i.e., unloading followed by loading in same wagons shall be 5.0 hours. This free time of 5.0 hours will be applicable for loading/unloading of containers in 'Normal (700 M length)' Single Stack Container rake of 90 TEUs. Accordingly, **Free Time applicable for loading/unloading of Containers in Double Stack Normal rake (180 TEUs) & Double Stack Long haul rake (360 TEUs) will be 10.0 hours & 20.0 hours respectively.**

The rakes of Vadhvan Port will consist of 'Double Stack Normal (180 TEUs)' & 'Double Stack Long-haul (360 TEUs)' in the ration of 70% & 30% respectively.

Vadhvan Port is projected to handle **34 EXIM Container rakes (inward & outward) rakes per day by year 2030.** At Container Handling yard, for handling EXIM Containers, double operation of container traffic i.e., unloading followed by loading in the same wagons is carried out. Hence, Container Handling yard will be **required to handle 17 (34/2) Container rakes per day (unloading followed by loading in the same wagon).** Out of 17 rakes, 12 rakes (70%) and 5 rakes (30%) will be of long haul and normal respectively.

In Container Handing yard, **18 lines (in 3 clusters/groups) have been proposed** for loading/unloading, sufficient to handle 17 container rakes per day within the stipulated free time.

LPG will be loaded in 'Mechanized way' through a Loading Gantry, whereas Fertilizer bags will be loaded 'Manually'.

As per extant guideline Issued by Railway Board vide Rates Circular Demurrage-Wharfage-Waiver /2016/0, Permissible **Free Time for loading of LPG & Fertilizer will be 6.0 hours & 11.0 hours respectively.**

Vadhvan Port rakes will arrive at proposed Holding Yard of VPPL at New Palghar station of WDFC. Rakes from Holding yard will move towards Port yard through main/lead line & proposed Rail Fly Over (RFO) / Rail Over Rail (ROR). The proposed Holding yard, main/lead

line & RFO/ROR upto Port Railway Gate will be 'Fully Electrified' with 2x25 KV & High rise OHE with contact wire height of 7.45 m. Port yard from Port Railway Gate upto the last dead end of In-Port Yard will be 'Electrified' with 1x25 KV & High rise OHE with contact wire height of 7.45 m.

Inside Port yard, Loading of Containers on 'BLC' wagons require operation from top by Rail Mounted Gantry Crane (RMGC). Hence, the yards earmarked for loading of containers cannot be 'fully wired'. Only 'Top Wiring' will be provided for attachment/detachment of Railway Electric loco i.e., electrification will be limited to the point which will not infringe use of RMGC and is safe from all other angles. In this case, at Port yard, the container rakes will 'hypothetically' require 'reversal of engine' for placement of containers rakes on handling line by 'pushing mode'.

Similarly, at New Palghar station/Holding yard, for dispatch the Port rakes to New Saphale side will 'hypothetically' also require 'reversal of engine'.

The Consultant has discussed the issue of engine reversal of Vadhvan Port Container rakes with concerned DFCCIL officials. To avoid engine reversal, DFCCIL have indicated that Vadhvan Port container rakes from WDFC will be placed at Port yard with Electric locomotive at either end. The leading loco will be in 'operation' & the rear loco will be in 'dead condition'.

For loading of 'LPG' in BTPGLN tank wagons, top cover of wagons needs to be lifted for opening the operating valve. This operation can be carried out only by climbing on top of the wagons. Hence, for loading of 'LPG' in tank wagons, the proposed LPG loading line cannot be 'fully wired'. The LPG loading line will be 'Top Wired' for attachment/detachment of Railway Electric loco.

Fertilizer yard is proposed parllel to LPG yard. Fertilizer yard will be 'Fully wired'.

7.2 System of Operation

Vadhvan Port traffic will arrive at proposed New Palghar station from both directions i.e. New Gholvad (UP side) & New Saphale (DN side) stations of WDFC. However, it is envisaged that majority (about 90%) of Container rakes of Vadhvan Port will arrive at New Palghar station from North India (New Gholvad side).

All lines of Container Handling yard will be of CSR-1500 M to handle long-haul rakes.

LPG & Fertilizer Handling lines will be of CSR-750 M to handle normal rakes.

Vadhvan Port yard consists of two separate yards viz Container & LPG/Fertilizer yards for handling Container and LPG/ Fertilizer.

The rake movement/operation between the proposed Holding yard at New Palghar station and Vadhvan Port will be operated through the proposed Cabin 'A', Cabin 'B' and Port Station. The details of the proposed Cabin 'A', Cabin 'B' and Port Station are discribed below:

7.2.1 Proposed 'Cabin A' of Holding yard at New Palghar Station

Electronic Interlocking (EI) system is proposed at 'Cabin A' of Holding Yard as has been provided on WDFC. The proposed Holding yard of VPPL will be operated by the 'Cabin A'. The

Lead line from Holding yard to RFO/ROR will also be operated by 'Cabin A'. Cabin B is proposed Near RFO/ROR.

The two ends (i.e., Cabin A and Cabin B) will be provided with electronic interlocking system while the main/ lead line between the Holding yard and RFO/ROR will have automatic signalling system as has been provided on WDFC. There are Two Relay huts for object controller installed at RH1 and RH2, and will control nearby points and signals to reduce the cable requirements and ease in maintenance.

7.2.2 Proposed 'Cabin B' near RFO/ROR

Electronic Interlocking (EI) system is proposed at 'Cabin B' as has been provided on WDFC. The Proposed Lead Line between RFO/ROR to Port Yard Gate will be operated by the 'Cabin B'. Service Building is proposed inside the Port Yard

The two additional ALH are provided with Electronic Interlocking system as the main/ lead line between the Holding yard and RFO/ROR will have Automatic Signalling system, as has been provided on WDFC. Each ALH including B cabin will control approximate 6 Signals and connecting MSDAC that is a region of 6 Km (Inter signal distance is 2 Km), the ALH will also house MSDAC racks and IPS with independent power supply.

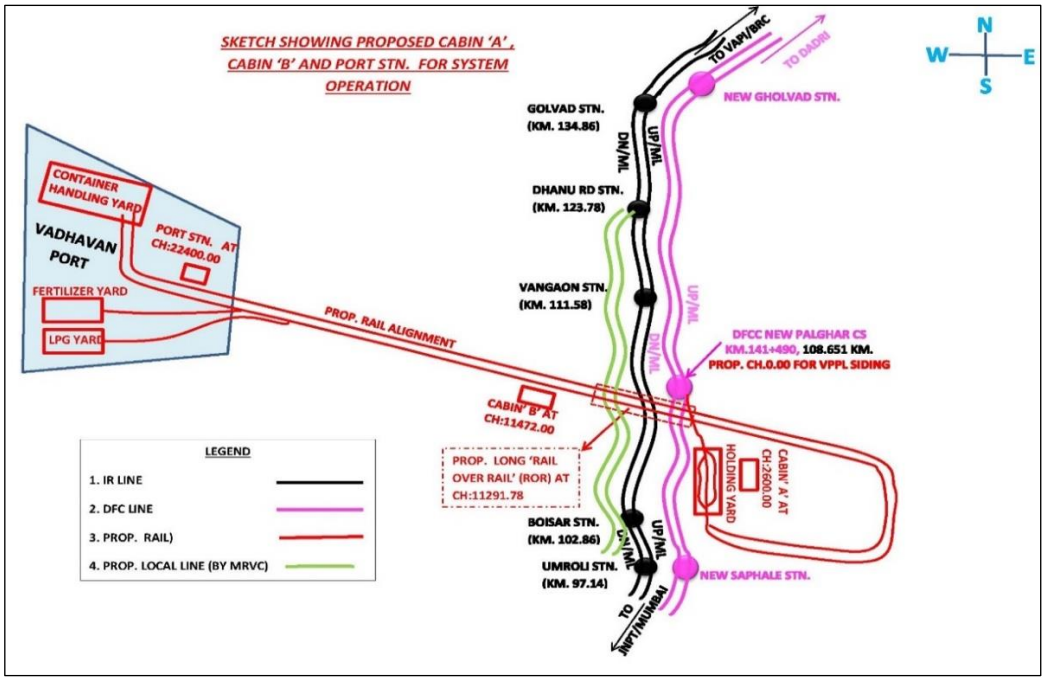
7.2.3 Proposed 'Port Station' inside Port Yard

Electronic Interlocking (EI) system is proposed at service building as has been provided on WDFC. The Proposed Container stabling yard/Container handling yard and LPG/Fertilizer yard will be operated by the Port Station to be installed inside the proposed Service Building. All points will be interlocked inside the port yard.

The Signalling system will have the function of Train Detection (TD), Electronic Interlocking (EI), Automatic signalling in Block sections and Train Monitoring and Diagnostic System (TMS).

The sketch showing Cabin 'A', Cabin 'B' and Port Station is placed below as Figure 7-1:-

Figure 7-1, Sketch Showing Cabin 'A', cabin 'B' and Port Station



7.2.4 Loading /Unloading of Container at Vadhvan Port

7.2.4.1 Traffic coming from New Gholvad side and going to New Gholvad side

Steps	Description
Step-1	Vadhvan Port BLC long haul rake coming from New Gholvad side, will be received on any vacant line of proposed Holding yard of VPPL at New Palghar station of WDFC.
Step-2	Station Master of proposed 'Cabin A' at Holding yard will contact Station Master of proposed 'Cabin B' and intimate the arrival of rake of VPPL at Holding yard. After that Station Master of 'Cabin B' will contact Station Master of Port Yard and intimate the arrival of VPPL rake at Holding yard.
Step-3	After intimation by Station Master of 'Cabin B', proposed near RFO/ROR, the railway electric loco will be pulled the rake along with the brake van from holding yard and moves towards VPPL's railway siding through the Lead Line/ROR of VPPL. After running 18.0 KM through lead line of VPPL the rake will reach Railway Port Gate. To avoid engine reversal of rakes in Port yard, Vadhvan Port rakes from WDFC will be placed at Port yard with Electric locomotive at either end. The leading loco will be in 'operation' & the rear loco will be in 'dead condition' Since loading/unloading of containers is carried out from top, the handling line cannot be 'fully electrified'. Hence, only 'Top wiring' will be provided. On container handling line, rake can be placed only by 'Backing'. After reaching edge of container loading/unloading line, the leading electric loco will be switched off/dead and rear electric loco will be brought in operation. The rear loco will push the rake to any vacant container loading/unloading line through 'Top Wiring' provided at Vadhvan Port gate side of container loading/unloading line.
Step-4	After loading/unloading, Port Yard Master will inform to Station Master of 'Cabin B' for movement of rake to the serving station. After that Staion Master of Cabin B will inform to Cabin A for rake movement to the serving station.
Step-5	After intimation, the rake will require to be moved to New Palghar station. Now for movement of the rake, the original leading electric loco in dead condition will be at rear position and original rear electric loco will be in leading position for movement to New Palghar station
Step-6	After crossing Vadhvan Railway Port gate, container rake will procced to New Palghar station through main/lead line & ROR and placed the rake on any vacant line of Holding yard.
Step-7	The rake is ready for further movement to New Gholvad side.

7.2.4.2 Traffic coming from New Saphale side and going to New Saphale side

Steps	Description
Step-1	Vadhvan Port BLC long haul rake coming from New Saphale side, will be received on any vacant line of New Palghar station of WDFC.
Step-2	Station Master of New Palghar Station will inform to Station Master of proposed 'Cabin A' of Holding yard and intimate the arrival of rake of VPPL.
Step-3	After Intimation by station Master of New Palghar, the rake will be received on any Vacant line of proposed Holding Yard at New Palghar station.
Step-4	Station Master of proposed 'Cabin A' at Holding yard will contact Station Master of proposed 'Cabin B' and intimate the arrival of rake of VPPL at Holding yard. After that Station Master of 'Cabin B' will contact Station Master of Port Yard and intimate the arrival of VPPL rake at Holding yard.
Step-5	After intimation by station Master of 'Cabin B', proposed near RFO/ROR, the railway electric loco will be pulled the rake along with the brake van from holding yard and moves towards VPPL's railway siding through the Lead Line/ROR of VPPL. After running 18.0 KM through lead line of VPPL the rake will reach Railway Port Gate. **To avoid engine reversal of rakes in Port yard, DFCCIL has proposed that Vadhvan Port rakes from WDFC will be placed at Port yard with Electric locomotive at either end**. The leading loco will be in 'operation' & the rear loco will be in 'dead condition' Since loading/unloading of containers is carried out from top, the handling line cannot be 'fully electrified'. Hence, only 'Top wiring' will be provided. On container handling line, rake can be placed only by 'Backing'. After reaching edge of container loading/unloading line, the leading electric loco will be switched off/dead and rear electric loco will be brought in operation. The rear loco will push the rake to any vacant container loading/unloading line through 'Top Wiring' provided at Vadhvan Port gate side of container loading/unloading line.
Step-6	After loading/unloading, Port Yard Master will inform to Station Master of 'Cabin B' for movement of rake to the serving station. After that Staion Master of Cabin B will inform to Cabin A for rake movement to the serving station.
Step-7	After intimation, the rake will require to be moved to New Palghar station. Now for movement of the rake, the original leading electric loco in dead condition will be at rear position and original rear electric loco will be in leading position for movement to New Palghar station

Step-8	After crossing Vadhvan Railway Port gate, container rake will procced to New Palghar station through main/lead line & ROR and placed the rake on any vacant line of holding yad.
Step-9	The rake is ready for further movement to New Saphale side.

7.2.5 Loading of LPG at Vadhvan Port

7.2.5.1 Traffic coming from New Gholvad side and going to New Gholvad side

Steps	Description
Step-1	Vadhvan Port LPG rake coming from New Gholvad side, will be received on any vacant line of proposed Holding yard of VPPL at New Palghar station of WDFC.
Step-2	LPG rakes are provided with Brake van at either side. Hence, no brake van reversal activity is required.
Step-3	Station Master of proposed 'Cabin A' at Holding yard will contact Station Master of proposed 'Cabin B' and intimate the arrival of rake of VPPL at Holding yard. After that Station Master of 'Cabin B' will contact Station Master of Port Yard and intimate the arrival of VPPL rake at Holding yard.
Step-4	After intimation by station Master of 'Cabin B', proposed near RFO/ROR, the railway electric loco will be pulled the rake along with the brake van from holding yard and moves towards VPPL's railway siding through the Lead Line/ROR of VPPL. After running 18.0 KM through lead line of VPPL the rake will enter into the Port yard and placed the rake on R&D Line No. 1 of LPG Yard
Step-5	After placement of the rake on R&D line No.1, the railway electric loco will be detached and reversed through the Engine reversal Line No.2 and and attached at the rear next to the Brake van of the rake at Port Gate.
Step-6	After attachment of the railway electric loco, the railway electric loco will push the rake with brake van at either end towards LPG loading line and placed the empty rake on LPG loading line.
Step-7	After the placement on LPG Loading line, the railway electric loco will be detached and proceed towards R&D yard and enter the 'Dummy Wagon Line' to attach stabled four dummy wagons.
Step-8	After the attachment of dummy wagons, the railway electric loco will proceed to LPG loading line to attach dummy wagons to empty LPG rake.
Step-9	After attachment of dummy wagons, the loco will 'Push/Back' the empty rake towards LPG gantry.
Step-10	The wagons in the rake from R&D yard end will be in following sequence: Loco+4 Dummy Wagons+BVG+32LPG Tankers + BVG.
Step-11	The loco will first place the second half (16 Tankers – Nos 17 to 32) of LPG rake under second gantry and BVG at Dead end
Step-12	After placement of second half, 16th tanker will be uncoupled from 17th tanker

Step-17	The loco will pull the balance rake towards the R&D yard to create gap of 50 M and place first half of LPG rake under first gantry.
Step-13	After completion of LPG loading, the 'balance rake' will be attached to the loaded LPG rake to form full rake
Step-14	After rake formation, the 'Dummy Wagons' will be detached by loco for placement on 'Dummy Wagon line'
Step-15	The loaded LPG rake will be pulled by the loco for placement on R&D Line No.1. of LPG yard.
Step-16	The loaded LPG rake will now be ready to proceed to the serving station.
Step-17	After loading LPG rake, Port Yard Master will inform to Station Master of 'Cabin B' for movement of rake to the serving station. After that Staion Master of Cabin B will inform to station Master of 'Cabin A' for rake movement to the serving station.
Step-18	After intimation, the rake will require to be moved to New Palghar station.
	After crossing Vadhvan Port gate, container rake will procced to New Palghar station through main/lead line & ROR and placed the rake on any vacant line of holding yad.
Step-19	The rake is ready for departure towards New Gholvad side.

7.2.5.2 Traffic coming from New Saphale side and going to New Saphale side

Steps	Description
Step-1	Vadhvan Port LPG rake coming from New Saphale side, will be received on any vacant loop line of New Palghar station of WDFC.
Step-2	Station Master of New Palghar Station will inform to Station Master of proposed 'Cabin A' of Holding yard and intimate the arrival of rake of VPPL.
Step-3	After Intimation by station Master of New Palghar, the rake will be received on any Vacant line of proposed Holding Yard at New Palghar station.
Step-4	LPG rakes are provided with Brake van at either side. Hence, no brake van reversal activity is required.
Step-5	Station Master of proposed 'Cabin A' at Holding yard will contact Station Master of proposed 'Cabin B' and intimate the arrival of rake of VPPL at Holding yard. After that Station Master of 'Cabin B' will contact Station Master of Port Yard and intimate the arrival of VPPL rake at Holding yard.
Step-6	After intimation by station Master of 'Cabin B', proposed near RFO/ROR, the railway electric loco will be pulled the rake along with the brake van from holding yard and moves towards VPPL's railway siding through the Lead Line/ROR of VPPL. After running 18.0 KM through lead line of VPPL the rake will enter into the Port yard and placed the rake on R&D Line No. 1 of LPG Yard

Step-7	After placement of the rake on R&D line No.1, the railway electric loco will be detached and reversed through the Engine reversal Line No.2 and attached at the rear next to the Brake van of the rake at Port Gate.
Step-8	After attachment of the railway electric loco, the railway electric loco will push the rake with brake van at either end towards LPG loading line and placed the empty rake on LPG loading line.
Step-9	After the placement on LPG Loading line, the railway electric loco will be detached and proceed towards R&D yard and enter the 'Dummy Wagon Line' to attach stabled four dummy wagons.
Step-10	After the attachment of dummy wagons, the railway electric loco will proceed to LPG loading line to attach dummy wagons to empty LPG rake.
Step-11	After attachment of dummy wagons, the loco will 'Push/Back' the empty rake towards LPG gantry.
Step-12	The wagons in the rake from R&D yard end will be in following sequence: Loco+4 Dummy Wagons+BVG+32LPG Tankers + BVG.
Step-13	The loco will first place the second half (16 Tankers – Nos 17 to 32) of LPG rake under second gantry and BVG at Dead end
Step-14	After placement of second half, 16th tanker will be uncoupled from 17th tanker
Step-15	The loco will pull the balance rake towards the R&D yard to create gap of 50 meters and place first half of LPG rake under first gantry.
Step-16	After completion of LPG loading, the 'balance rake' will be attached to the loaded LPG rake to form full rake
Step-17	After rake formation, the 'Dummy Wagons' will be detached by loco for placement on 'Dummy Wagon line'
Step-18	The loaded LPG rake will be pulled by the loco for placement on R&D Line No.1. of LPG yard.
Step-19	The loaded LPG rake will now be ready to proceed to the serving station.
Step-20	After loading LPG rake, Port Yard Master will inform to Station Master of 'Cabin B'. After that Staion Master of Cabin B will inform to station Master of 'Cabin A' for rake movement to the serving station.
Step-21	After intimation, the rake will require to be moved to New Palghar station.
Step-22	After crossing Vadhvan Port gate, container rake will procced to New Palghar station through main/lead line & ROR and placed the rake on any vacant line of holding yad.
Step-13	The rake is ready for departure towards New Saphale side.

7.2.6 Loading of Fertilizer at Vadhvan Port

1.1.1.1 Traffic coming from New Gholvad side and going to New Gholvad side

Steps	Description
Step-1	Vadhvan Port Fertilizer rake coming from New Gholvad side, will be received on any vacant line of proposed Holding yard of VPPL at New Palghar station of WDFC.
Step-2	Station Master of proposed 'Cabin A' at Holding yard will contact Station Master of proposed 'Cabin B' and intimate the arrival of rake of VPPL at Holding yard. After that Station Master of 'Cabin B' will contact Station Master of Port Yard and intimate the arrival of VPPL rake at Holding yard.
Step-3	After intimation by station Master of 'Cabin B', proposed near RFO/ROR, the railway electric loco will be pulled the rake along with the brake van from holding yard and moves towards VPPL's railway siding through the Lead Line/ROR of VPPL. After running 18.0 KM through lead line of VPPL the rake will enter into the Port yard.
Step-4	Fertilizer yard will be 'Fully wired'. Sick line and adjacent break van siding will also be 'Fully Electrified'. Hence, after crossing Vadhvan Port gate, the rake will be placed directly into Fertilizer loading line.
Step-5	The 'electric loco' hauling the rake will be detached from dead end side of the Fertilizer yard.
Step-6	The loco will be moved towards Vadhvan gate end of the rake through the adjacent engine line for detachment of break van.
Step-7	After detachment of break van, the loco along with break van will again move for reversal of break van on adjacent break van siding.
Step-8	After reversal, the break van will be attached at dead end side of the Fertilizer yard.
Step-9	After attachment of break van, the loco will be attached at Vadhvan gate end of the rake.
Step-10	After loading, Port Yard Master will inform to Station Master of 'Cabin B'. After that Staion Master of 'Cabin B' will also inform to 'Cabin A' for rake movement to the serving station.
Step-11	After intimation, the rake will require to be moved to New Palghar station. The electric loco will 'Pull' the rake towards In -Motion Weighbridge proposed on lead line of Fertilizer yard at Vadhvan gate.
Step-12	After Weighment, the rake will proceed towards New Palghar station.
Step-13	After crossing Vadhvan Port gate, container rake will procced to New Palghar station through main/lead line & ROR and placed the rake on any vacant line of holding yad.
Step-14	The rake is ready for further movement to New Gholvad side.

1.1.1.2 Traffic coming from New Saphale side and going to New Saphale side

Steps	Description
Step-1	Vadhvan Port Fertilizer rake coming from New Saphale side, will be received on any vacant loop line of New Palghar station of WDFC.
Step-2	Station Master of New Palghar Station will inform to Station Master of proposed 'Cabin A' of Holding yard and intimate the arrival of rake of VPPL.
Step-3	After Intimation by station Master of New Palghar, the rake will be received on any Vacant line of proposed Holding Yard at New Palghar station.
Step-4	Station Master of proposed 'Cabin A' at Holding yard will contact Station Master of proposed 'Cabin B' and intimate the arrival of rake of VPPL at Holding yard. After that Station Master of 'Cabin B' will contact Station Master of Port Yard and intimate the arrival of VPPL rake at Holding yard.
Step-5	After intimation by station Master of 'Cabin B', proposed near RFO/ROR, the railway electric loco will be pulled the rake along with the brake van from holding yard and moves towards VPPL's railway siding through the Lead Line/ROR of VPPL. After running 18.0 KM through lead line of VPPL the rake will enter into the Port yard.
Step-6	Fertilizer yard will be 'Fully wired'. Sick line and adjacent break van siding will also be 'Fully Electrified'. Hence, after crossing Vadhvan Port gate, the rake will be placed directly into Fertilizer loading line.
Step-7	The 'electric loco' hauling the rake will be detached from dead end side of the Fertilizer yard.
Step-8	The loco will be moved towards Vadhvan gate end of the rake through the adjacent engine line for detachment of break van.
Step-9	After detachment of break van, the loco along with break van will again move for reversal of break van on adjacent break van siding.
Step-10	After reversal, the break van will be attached at dead end side of the Fertilizer yard.
Step-11	After attachment of break van, the loco will be attached at Vadhvan gate end of the rake.
Step-12	After loading, Port Yard Master will inform Station Master of 'Cabin B' After that Staion Master of 'Cabin B' will also inform to 'Cabin A' for rake movement to the serving station.

Step-13	After intimation, the rake will require to be moved to New Palghar station. The electric loco will 'Pull' the rake towards In-Motion Weighbridge proposed on lead line of Fertilizer yard at Vadhvan gate.
Step-14	After Weighment, the rake will proceed towards New Palghar station.
Step-15	After crossing Vadhvan Port gate, fertilizer rake will procced to New Palghar station through main/lead line & ROR and placed the rake on any vacant line of Holding yard.
Step-16	The rake is ready for further movement to New Saphale side.

7.3 Permissible Free Time for loading/unloading of Container rakes

As per extant guidelines issued by Railway Board vide Rates Circular Demurrage-Wharfage-Waiver /2016/0, Permissible Free Time for loading and unloading of Container rake (Normal Indian Railways rake of 90 TEUs) is 3.0 hours each.

Container traffic of Vadhvan Port will consist of 70% Double Stack Long haul rakes (360 TEUs each) & 30% Double Stack Normal rakes (180 TEUs). At Container Handling yard, for handling EXIM Containers, double operation of container traffic i.e., unloading followed by loading in same wagons will be carried out.

Hence, permissible free time of double operation of container traffic i.e., unloading followed by loading in same wagons shall be 5.0 hours. This free time of 5.0 hours will be applicable for loading/unloading of containers in 'Normal (700 M length)' Indian Railways Single Stack Container rake of 90 TEUs. Accordingly, **Free Time applicable for loading/unloading of Containers in Double Stack Normal rake (180 TEUs) & Double Stack Long haul rake (360 TEUs) will be 10.0 hours & 20.0 hours respectively.**

Railway Board's Rates Circular for Demurrage-Wharfage-Waiver /2016/0 is pasted below:

Figure 7-2, Railway Board Circular for Handling of Container Rakes

	Type of Wagons	Permissible free time (in hours : minutes)			
		MECHANIZED		MANUAL	
		Loading	Unloading	Loading	Unloading
2.2(a)(viii)	**TANK wagons** (black oil viz. light diesel oil, furnace oil, carbon black feed stock, low sulphur heavy stock, heavy petroleum stock, vacuum gas oil etc.) *(refer Rates Circular No.22 of 2006)*	7:00	7:00 (upto 29 wagons) 9:00 (30 wagons & more)	N.A.	N.A.
2.2(a)(ix)	**Military wagons**-KM	N.A.	N.A.	4:00	4:00
2.2(a)(x)	**Military wagons** other than KM wagons like DBKM etc.	N.A.	N.A.	5:00 (upto 20 wagons) 7:00 (21 wagons & more)	5:00 (upto 20 wagons) 7:00 (21 wagons & more)
2.2(b)	**Type of commodity**				
2.2((b)(i)	Container #	3:00	3:00	N.A.	N.A.
2.2(b)(ii)	Consignments handled by Crane*	7:00	8:00	N.A.	N.A.
2.2(b)(iii)	Livestock	N.A.	N.A.	4:00	4:00

This free time is relevant in the case of Indo-Nepal traffic. Permissible free time in case of double operation of container traffic i.e. unloading followed by loading in the same wagons, shall be 5 hours. However, in the case of container commodity handled by sling cranes, the free time for loading/unloading will be 6 hours for single operation and 8 hours for double operation.

* Free time mentioned here will be applicable when consignment is handled by crane, irrespective of the free time prescribed for different types of wagons.

7.4 Permissible Free Time for loading of LPG & Fertilizer rakes

'LPG' is transported in BTPGLN (Bogie Tanker Petroleum Gas Frameless Pneumatic brake) wagons and 'Fertilizer' is transported in BCNHL (Bogie Covered Pneumatic- brake Higher Load) wagons.

LPG will be loaded in 'Mechanized way' through a Loading Gantry, whereas Fertilizer bags will be loaded 'Manually'.

As per extant guideline Issued by Railway Board vide Rates Circular Demurrage-Wharfage-Waiver /2016/0, Permissible Free Time for loading of LPG & Fertilizer will be 6.0 hours & 11.0 hours respectively, placed below as

Figure 7-3**:-**

Figure 7-3, Railway Board Circular for Loading of LPG & Fertilizer Rakes

2.2(a)	Type of Wagons	Permissible free time (in hours & minutes)			
		MECHANIZED		MANUAL	
		Loading	Unloading	Loading	Unloading
2.2(a)(i)	**OPEN wagons** like BOXN, BOX, BOY, BOI, BOST, BOXNHA, BOXNHS, NBOY etc.	5:00	7:00	9:00	9:00
2.2(a)(ii)	**HOPPER wagons** like BOBS, NBOBS, BOBR, NBOBR, BOBY, NBOBY etc.	5:00	2:30	N.A.	N.A.
2.2(a)(iii)	**FLAT wagons** like BFR, BRH, BRN, BFK, BFKI, BFNS, CONCORD rakes etc.	6:00	N.A.	8:00	8:00
2.2(a)(iv)	**BCNHL wagons** *(refer Rates Circular No.1 of 2012)*	N.A.	N.A.	5:00 (1 to 20 wagons)	5:00 (1 to 20 wagons)
				7:00 (21 to 30 wagons)	7:00 (21 to 30 wagons)
				9:00 (31 to 45 wagons)	9:00 (31 to 45 wagons)
				11:00 (46 wagons & above)	11:00 (46 wagons & above)
2.2(a)(v)	**Covered wagons other than BCNHL**	N.A.	N.A.	5:00 (1 to 20 wagons)	5:00 (1 to 20 wagons)
				7:00 (21 to 30 wagons)	7:00 (21 to 30 wagons)
				9:00 (31 wagons & above)	9:00 (31 wagons & above)
2.2(a)(vi)	**BCFC** *(refer Rates Circular No.25 of 2015)*	12:00	12:00	N.A.	N.A.
2.2(a)(vii)	**TANK wagons** (in all cases other than those specified as black oil) *(refer Rates Circular No.22 of 2006)*	6:00	6:00 (upto 29 wagons)	N.A.	N.A.
			8:00 (30 wagons & above)		

8 Signal & Telecommunication

8.1 Signalling Arrangements on Main Line of WDFC

On Main and Running lines, WDFC proposes to provide 4 Aspect Multi Aspect Colour Light (MACL) LED Signals with Multi Section Digital Axle Counter (MSDAC). WDFC proposes to install MACL signals with spacing of 2 km for main and running lines. Signaling system shall be Electronic Interlocking (EI) of Standard -III. Signalling system on WDFC will also have function of Train Detection (TD), Train Protection Warning System (TPWS), Automatic signalling in Block section and Train Monitoring & Diagnostic System (TMS). All points on WDFC will be Electric Points.

8.2 Signalling arrangment at New Palghar Station of WDFC

New Palghar station of WDFC is a "B" class station, which is under construction. New Palghar station is situated on Vaitarana– Sachin 'Electrified' Double line section of Western Dedicated Freight Corridor (WDFC) at KM. 141+490. Standard-III(R) Electronic Interlocking (EI) with 4 Aspect Multiple Aspect Colour Light (MACL) LED signalling is provided at this station, which are controlled from 'Central Panel' installed in the station.

New Palghar station will be the 'Serving Station' for Railway connectivity for upcoming Vadhvan Port.

8.3 Proposed Signalling arrangment for Take off

The Proposed Vadhvan Port Siding is taking off from Dead End of Future UP Loop Line No.1A by proposed De-railing Switch (DS) at CH:992.50 (F/CSB) at New Saphale/Vaitarana end of New Palghar station.

Signalling arrangement at New Palghar station is 4 Aspect MACL with Central Electronic Interlocking system. The same type of signalling is proposed for Take-off of VPPL railway line and also for proposed new crossover between UP Main Line and DN Main line. The signalling arrangement will be augmented/altered at New Palghar station to incorporate the new facilities in view of proposed points/crossovers.

8.4 Proposed Signalling arrangement at Holding yard of VPPL

The signalling arrangement of Holding yard/lead line and Port yard has to be compliant with WDFC standards. Vadhvan Port railway connectivity will be provided with a signalling system which will integrate with the signalling system of WDFC.

The proposed Vadhvan Port Railway connectivity will be divided into Three (3) Sections for operation of VPPL rakes.

8.4.1 Section-1: Signalling arrangement at 'Cabin A' of Holding yard

Electronic Interlocking (EI) system is proposed at 'Cabin A' of Holding Yard as has been provided on WDFC. The proposed Holding yard of VPPL will be operated by the 'Cabin A'. The

Lead line from Holding yard to RFO/ROR will also be operated by 'Cabin A'. Cabin B is proposed Near RFO/ROR.

The two ends (i.e., Cabin A and Cabin B) will be provided with electronic interlocking system while the main/ lead line between the Holding yard and RFO/ROR will have automatic signalling system as has been provided on WDFC. There are Two Relay huts for object controller installed at RH1 and RH2, and will control nearby points and signals to reduce the cable requirements and ease in maintenance

8.4.2 Section- 2: Signalling arrangement at 'Cabin B' near RFO/ROR

Electronic Interlocking (EI) system is proposed at 'Cabin B' as has been provided on WDFC. The Proposed Lead Line between RFO/ROR to Port Yard Gate will be operated by the 'Cabin B'. Service Building is proposed inside the Port Yard.

The two additional ALH are provided with Electronic Interlocking system as the main/ lead line between the Holding yard and RFO/ROR will have Automatic Signalling system, as has been provided on WDFC. Each ALH including B cabin will control approximate 6 Signals and connecting MSDAC that is a region of 6 Km (Inter signal distance is 2 Km), the ALH will also house MSDAC racks and IPS with independent power supply.

8.4.3 Section-3: Signalling arrangement at 'Port Station' inside Port Yard

Electronic Interlocking (EI) system is proposed at service building as has been provided on WDFC. The Proposed Container stabling yard/Container handling yard and LPG/Fertilizer yard will be operated by the Port Station to be installed inside the proposed Service Building. All points will be interlocked inside the port yard.

The Signalling system will have the function of Train Detection (TD), Electronic Interlocking (EI), Automatic signalling in Block sections and Train Monitoring and Diagnostic System (TMS).

Appropriate data transmission system will be done between the two stations (i.e., 'Cabin A' to 'Cabin B' and Cabin B to Port Station Building) which would include Auto Location Huts, Control Centre, etc. The data transmission will be done through the Optical Fibre Network.

It is proposed to have the following types of signalling system:

- Signals: All the signals governing the movement of traffic will be 4 aspect Multi Aspect Colour Light (MACL) type.
- Point machines: The machines controlling the points will be operated electrically, high trust point machines will be provided to suit the size of turnouts.
- Means of train detection: For detection of trains on the point zone and berthing area it is proposed to provide MSDAC.
- Train Monitoring & Diagnostic System (TMS): It will be required to be installed for seamless connectivity to WDFC.
- Operating system: It is proposed to provide a centralized control panel in Station Master's office for the following reasons.
- The EI and 2 Relay huts with object controller is proposed for efficient operation of Port station yard, the Relay hut location is shown in the SIP.

i) To avoid multiplicity of control for faster operations of points and signals and to avoid inert-communication distortion amongst the various agencies involved in the train operation.

ii) To avoid human error.

iii) To ensure continuous monitoring of field conditions through various controls displayed in front of the SM, with a view to improve the reliability and safety train operations.

iv) The SM panel will be LED based having Electronic Interlocking.

Automatic Signalling: Automatic Signalling will be provided for train operation between:

- 'Cabin A' to Port Station EI, with inter- signal distance of 2 KM and Multi-Section digital Axle counter for Train detection with Auto Reset using Supervisory Track circuit, thus any single point failure of Axle counter will not require any human intervention for resetting.
  - **Power supply:** Auxiliary Transformer is proposed at each Relay hut/ Auto Location huts and Cabins, which will provide 3 phase 440 V from the OHE, further necessary IPS and DC-DC converters will be installed for functioning of Signalling system, Since the AT will be in redundant with UP and DN line. It will have assured supply for operation of central panels, point machines, signals etc. Further, in order to improve system reliability, the provision of integrated power supply system has been considered with Battery backup of around 6-8 hours. This will have an added advantage of ensuring uninterrupted power supply round the clock, preventing signal going blank.

8.5 Telecommunication

For efficient railway management and operation, it is essential to have a well-organized telecommunication network covering strategic locations like Port Railway Control Centre (PRCC), Connecting stations (New Palghar station of WDFC and Vadhvan Port Station) and Crew Rest Room. It is equally essential to have reliable links between the strategic locations, moving trains as well as working staff along the railway track.

The Telecommunications System will generally comprise of two main subsystems which would include Control Phone at each stations and Relay huts, further Provision of Wireless communication with VHF is proposed, GSM-R though being implemented on WDFCC is not feasible in this small section considering the cost, Additional systems of Electronic Private Automatic Branch Exchange Telephone System, Dispatch Telephone System Video Surveillance System. The system will provide all necessary communication channels for carrying voice, data, and video signals for railway management.

The OFC backbone transmission network with STM-4 system is proposed which shall provide the necessary communication channels on the Port Railway would have adequate high quality, and will have high reliability, availability and expandability.

8.6 Execution of S &T Works at New Palghar Station

The proposed alterations in Interlocking and Central panel at New Palghar station for take-off for Vadhvan Port connectivity will be executed by Railway.

Cost of S&T works at New Palghar station is estimated to Rs. 8.79 Crores.

8.7 Execution of S &T Works at Cabin A & B and Port Station (Phase 1)

Cost of S&T works at Cabin A, Cabin B and Port Station is estimated to Rs. 87.78 Crore. Cost of S&T works at New Palghar station is estimated to be 8.80 Crore.

Summary of the S&T Cost is placed below as **Table 8-1:**

Table 8-1, Summary of S&T Cost

Summary of S&T Cost		
Sr. No	**Name of work**	**Amount (in Lakhs)**
1	S&T Cost at New Palghar station	879.9
2	Cost of S&T works at Cabin A, Cabin B and Port Station	8778.0
	Total S&T Cost in Lakhs	9657.9
	Total S&T Cost Estimate in Crore (Phase-1) (Including In-Port Yard)	**96.58 Crore**

Detailed of S&T Cost Estimate is placed at **Section 14.2** of this Report.

9 Electrical

9.1 Over Head Equipment

New Palghar Station of WDFC is located on 'Electrifed' Vaitarana-Sachin section of WDFC at KM : 141+490, whis is under construction. New Palghar station of WDFC will be the 'Serving Station' for the Vadhvan Port railway connectivity.

The entire section of WDFC is being provided with '2x25 KV High rise OHE' to run Double Stack container normal and long-haul freight trains. Hence, New Palghar station will be provided with 'High rise OHE'.

'High- rise OHE (2 x 25 KV)' stipulates provision of Contact wire at 7.54 m instead of Normal OHE (1x25KV) at 5.6 m. Also, for 'High-rise OHE' OHE structure/Mast of 12.0 m will need to be provided instead of 9.5 m. The major operational advantages of 'High rise OHE' are:

- Higher hauling capacity
- Increased Traction Substation (TSS) spacing at 60-80 km apart against existing spacing of 40 km
- Improved voltage regulation and reduced transmission line losses
- Seamless running of locomotives from 1x25KV to 2x25KV system

Vadhvan Port yard will be required to handle traffic from Western Dedicated Freight Corridor (WDFC).

The Proposed Vadhvan Port Siding is taking off from Dead End of Future UP Loop Line No.1A by proposed De-railing Switch (DS) at CH:992.50 (F/CSB) at New Saphale/Vaitarana end of New Palghar station.

Vadhvan Port take off will be taken from New Palghar station of WDFC where the track is electrified with AT Feeding System with 2x25KV AC, 50 C/S. WDFC Electrification is of AT Feeding System with the electric power for railway traction is supplied in AC 50 Hz, single-phase through 2x25 KV AT feeding system, which has a feeding voltage from the traction substation (TSS), two times as high as the catenary voltage, which is 25 KV with respect to earth/rail. The power fed from the TSS through catenary and feeder wire is stepped down to the catenary voltage by means of autotransformers (ATs) installed after about every 13 to 17 km along the track, and then fed to the locomotives. In other words, both the catenary and feeder voltage are, 25 KV with respect to the earth/rail, although the substation feeding voltage between catenary and feeder wires is 2x25 KV. The catenary voltage is therefore, the same as that in the conventional 25 KV system.

New Palghar station is located in Makarpura – JNPA section, having tentatively 10 Nos of TSSs, 10 Nos of SPs, Total of 34 Nos SSPs and 4 Nos stand- alone ATs in the OCC architecture.

Existing facilities: Switching Post (SSP) near New Palghar station towards Makarpura end of the station will be the source of taking power supply with suitable modification with Circuit Breaker and Auto Transformer with other accessories. The existing 'High rise OHE' is Auto Transformer Feeding System with 2x25KV AC, 50 C/S.

Proposed electrification: A 'Holding yard' consisting of 8 lines is proposed and line no 3 & 4 will be electrified with 2x25 KV high rise with feeder line and will run up to the entrance gate of Port yard. The other lines of the 'holding yard' will be electrified with 25KV taking the catenary and rail connection from Auto Transformer of existing SSP. The Holding yard is proposed to electrify with portal suitable for 'High rise OHE'.

New Switching station (SSP) is proposed just before the gate Port yard to allow sectioning after within and up to 20 KM from New Palghar station.

Since feeder line can be extended inside the port, the Port yard is proposed to be electrified with conventional 25 KV and 18 Nos container loading /unloading lines will be 'top wired'.

SCADA system is also proposed to monitor the traction power supply system and to isolate the yard during failure, Breakdown and maintenance purposes.

Vadhvan Port rakes will arrive at proposed Holding Yard of VPPL at New Palghar station of WDFC. Rakes from Holding yard will move towards Port yard through main/lead line & proposed Rail Fly Over (RFO) / Rail Over Rail (ROR). The proposed Holding yard, main/lead line & RFO/ROR upto Port Railway Gate will be 'Fully Electrified' with 2x25 KV & High rise OHE with contact wire height of 7.45 m. Port yard from Port Railway Gate upto the last dead end of In-Port Yard will be 'Electrified' with 1x25 KV & High rise OHE with contact wire height of 7.45 m.

Vadhvan Port yard will consist of two separate yards viz Container & LPG/Fertilizer yards for handling Container and LPG/ Fertilizer.

Inside Port yard, Loading of Containers on 'BLC' wagons require operation from top by Rail Mounted Gantry Crane (RMGC). Hence, the yards earmarked for loading of containers cannot be 'fully wired'. Only 'Top Wiring' will be provided for attachment/detachment of Railway Electric loco i.e., electrification will be limited to the point which will not infringe use of RMGC and is safe from all other angles.

To avoid engine reversal, DFCCIL have intimated that Vadhvan Port container rakes from WDFC will be placed at Port yard with Electric locomotive at either end. The leading loco will be in 'operation' & the rear loco will be in 'dead condition'.

For loading of 'LPG' in BTPGLN tank wagons, top cover of wagons needs to be lifted for opening the operating valve. This operation can be carried out only by climbing on top of the wagons. Hence, for loading of 'LPG' in tank wagons, the proposed LPG loading line cannot be 'fully wired'. The LPG loading line will be 'Top Wired' for attachment/detachment of Railway Electric loco. The LPG R & D yard will be 'fully wired'. Necessary precaution will be arranged for LPG loading line like forming of neutral zone both in rail and OHE with earthing system.

Fertilizer yard is proposed parllel to LPG yard. Fertilizer yard will be 'Fully wired'.

9.2 Provision of OHE for Holding Yard

The Proposed Holding yard will be the 'Fully Electrified', The details of the Holding yard is placed below as **Table 9-1:**

Table 9-1, Holding Yard Details

Proposed facilities at Holding yard			
Sr. No.	Details	Salient Features	Remarks
1	Loop Line No.1	CSR-1680.88M	'Fully Wired'
2	Loop Line No.2	CSR-1727.37 M	
3	Loop Line No.3	CSR-1723.91 M	
4	Loop Line No.4	CSR-1723.91 M	
5	Loo Line No.5	CSR-1839.608 M	
6	Loo Line No.6	CSR-1693.967 M	
7	Loop Line No.7	CSR-1549.696 M	
8	Loop Line No.8	CSR-1500 M	

9.3 Provision of OHE for Main/Lead Line

The Porosed Main/Lead Double Line from Holding yard to Port Gate will be 'Fully Wired'. The detials of the Lead line is placed below as **Table 9-2:**

Table 9-2, Main/Lead Line Details

Sr. No.	Details	Salient Features	Remarks
1	Main/Lead Double Line of proposed Vadhvan Port connectivity	About 18 KM	'Fully Wired'

9.4 Provision of OHE for In -Port Yrad

In-Port Yard is divided into Two (2) yards.

- Container Handling Yard/Container Stabling Yard
- LPG/Fertilizer yard

Table 9-3, Container Stabling Yard Details

Sr. No.	Details	Salient Features	Remarks
Proposed facilities at Container Stabling Yard			
1	Stabling Line No.1	CSR-1500	'Fully Wired'
2	UP Main Line No.2	CSR-1500 M	

3	DN Main Line No.3	CSR-1500 M	
4	Stabling Line No.4	CSR-1500 M	

Table 9-4, Container Handling Yard Details

Proposed Facilities at Container Handling Yard (In-Port yard)					
Sr. No.	Cluster/ Group	Line No.	Activity	CSR (M)	Remarks
1	A	Line No. 1	Loading/Unloading	1500	'Top Wired'
		Line No. 2	Loading/Unloading	1500	
		Line No. 3	Loading/Unloading	1500	
		Line No. 4	Loading/Unloading	1500	
		Line No. 5	Loading/Unloading	1500	
		Line No. 6	Loading/Unloading	1500	
		Line No. 7	Sick Line	140	'Fully Wired'
2	B	Line No. 8	Loading/Unloading	1500	'Top Wired'
		Line No. 9	Loading/Unloading	1500	
		Line No.10	Loading/Unloading	1500	
		Line No.11	Loading/Unloading	1500	
		Line No.12	Loading/Unloading	1500	
		Line No.13	Loading/Unloading	1500	
		Line No.14	Sick Line	140	'Fully Wired'
3	C	Line No.15	Loading/Unloading	1500	'Top Wired'
		Line No.16	Loading/Unloading	1500	
		Line No.17	Loading/Unloading	1500	
		Line No.18	Loading/Unloading	1500	
		Line No.19	Loading/Unloading	1500	
		Line No.20	Loading/Unloading	1500	
		Line No.21	Sick Line	140	'Fully Wired'

Table 9-5, Proposed LPG Yard Details

Proposed LPG Yard				
SN	Line No.	Description	CSR (m)	Remarks
1	Line No. 1	R&D Line	750	'Fully Wired'
2	Line No. 2	Engine Line	750	
3	Line No.3	Loading Line	750	'Top Wired'
4	Line No.4	Dummy Wagon Line	100	'Fully Wired'

Table 9-6, Proposed Fertilizer Yard Details

Proposed Fertilizer Yard				
SN	**Line No.**	**Description**	**CSR (m)**	**Remarks**
1	Line No. 1	Loading Line	750	'Fully Wired'
2	Line No. 2	Engine Reversal Line	750	
3	Line No. 3	BVG (Break Van) Line	75	
4	Line No. 4	Sick Line	120	'Fully Wired'

1.1.2 Cost Estimate of OHE:

Total TKM for OHE is estimated to be 103.00 TKM. Out of which, 54 TKM will be wired with 2x25 KV AT feeding system and the rest 49 TKM will be wired with 1x25 KV.

The Summary of the OHE cost is placed below as Table 9-7:-

Table 9-7, Summary of OHE Cost Estimate

Over Head Electrification (OHE)			
Description	**Amount (Rs.)**		**Total Amount (Rs.)**
	PH-1		
	From Take-off to Vadhvan Port Gate	**Inside Port Gate (Track and OHE)**	
OHE Works	68,28,50,237	44,23,67,911	1,12,52,18,148
OHE-PSI	9,99,66,339		9,99,66,339
Total	**78,28,16,576**	**44,23,67,911**	**1,22,51,84,487**

Detailed Cost estimate of OHE works is attached at **Section 14.3** of this Report.

9.5 General Electric Supply (Port Yard Lighting)

Vadhvan Port will provide adequate High Mast Tower based light, other forms of illumination and general-electric supply inside In-Port yard. However, additional illumination, if required, for Railway yard will be carried out by Vadhvan Port.

The Cost of General Electric Supply (Port yard Lighting) is estimated to be Rs.4.00 Crore.

Hence, Total Cost of Electrical is estimated to be Cost of OHE+ Cost of General Electric Supply= Rs 122.52+ Rs 4.00= Rs 126.52 Crore

10 Commercial Facilities

10.1 Commercial Facilities

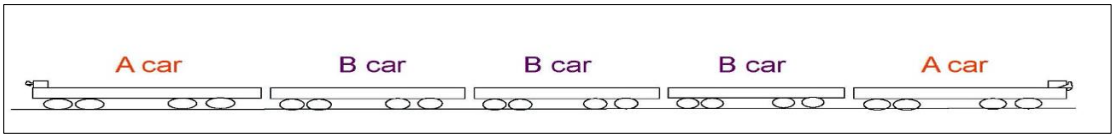
- **Provision of In-Motion Weigh Bridge:** Four (4) In-motion Weigh Bridges (IMWBs) as per RDSO Specification no WD-29-MISC-19 (Rev.1) with tangent length of 100 meters on either side are proposed.
- **Payment of Freight:** Freight or haulage charges on traffic booked from and to Vadhvan Port will be charged on the basis of charging of Freight on 'Through Distance Basis' as per Rates Master Circular of 2014 issued by Railway Board.
- **Commercial Formalities:** For preparation RRs for outward Container, LPG & Fertilizer traffic, Railway Commercial Staff will be posted inside Port yard.
- **Permissible Free Time:** Vide Railway Board's Rates Circular Demurrage-Wharfage-Waiver /2016/0, Permissible Free Time for loading and unloading of Container rake (Normal Single Stack rake of 90 TEUs) is 3.0 hours each.
  Vadhvan Port is projected to handle **34 EXIM Container rakes (inward & outward) rakes per day by year 2030.** At Container Handling yard, for handling EXIM Containers, double operation of container traffic i.e., unloading followed by loading in the same wagons is carried out. Hence, Container Handling yard will be **required to handle 17 (34/2) Container rakes per day (unloading followed by loading in the same wagon).** Container traffic of Vadhvan Port will consist of 70% Double Stack Long haul rakes (360 TEUs each) & 30% Double Stack Normal rakes (180 TEUs). Hence, out of 17 rakes, 12 rakes (70%) and 5 rakes (30%) will be of long haul and normal respectively.
  As per Railway Board guidelines mentioned above, Permissible free time of double operation of container traffic i.e., unloading followed by loading in same wagons shall be 5.0 hours. This free time of 5.0 hours will be applicable for loading/unloading of containers in 'Normal (700 M length)' Single Stack Container rake of 90 TEUs. Accordingly, **Free Time applicable for loading/unloading of Containers in Double Stack Normal rake (180 TEUs) & Double Stack Long haul rake (360 TEUs) will be 10.0 hours & 20.0 hours respectively.**
- **TMS Facilities:** TMS hardware peripheral will be installed by VPPL in Railway Service Building, Air Conditioned for FOIS and for issuing computerized RRs. Railway will provide the Software.
- Office accommodation for commercial staff with TMS Terminal of FOIS and Air-conditioned Train Crew Rest room will be provided by VPPL in Railway Service Building.
- VPPL will execute of e-payment agreement for payment of Railway Freight.
- Construction of terminals should be done in such a manner so that it can be notified on through distance basis in terms of extant instructions.
- VPPL will abide by all the extant instructions in force.

11 Mechanical

11.1 Mechanical

On Indian Railways, containers are transported in 'BLC' type of wagons. BLC specifies Bogie Low platform Container. The wagons come in two types as 'A' and 'B'. Both these types are joined/coupled in the combination of: A+B+B+B+A to form One Unit. The existing each container (BLC) rake on Indian Railways consists of above 9 Units (total- 45 BLC wagons). Each BLC wagon can carry 2 TEUs in 'Single Stack' mode. Each 'Single stack BLC rake of Indian Railways' can transport 90 TEUs (2x45TEUs). On WDFC, container rakes will be of 'Long haul' length with 'double stack container' on each BLC wagon (total- 90 BLC wagons). Hence, carrying capacity of each 'Double Stack BLC rake of WDFC' will be 360 TEUs (2x2x90 TEUs). The pattern of coupling of A &B cars of BLC wagon to form one unit is placed below as **Figure 11-1:**

Figure 11-11-1, Pattern of A&B cars of BLC Wagon to form One Unit



- Crew Rest Room facility with amenities will be proposed inside VPPL's premises.
- All precautions will be observed by VPPL while loading / unloading of wagons.
- FOIS terminals will be provided inside the Port Terminal as Commercial facility.
- No C&W facility is proposed inside Port yard d. However, if C&W facilities are operationally required as per extant instructions, only one- time capital cost for setting-up C&W facilities shall be borne by Vadhvan Port. Operational cost including staff cost shall however be borne by Railway
- Shunting operation of all rakes inside In-Port yard will be carried by the Train Electric Engine. Hence, there is no necessity to procure captive Shunting Locomotives for VPPL. Hence, no Loco Shed has been proposed.
- **Scanning (X-ray) of Containers:** VPPL envisages to install Rail Container Scanners adhering to Atomic Energy Regulatory Board Specifications, of requisite numbers, to scan containers on a moving train to enhance efficiency and faster custom clearance of containers for Rail borne EXIM traffic.
- **Provision of In-Motion Weigh Bridges:** Four (4) In-motion Weigh Bridges (IMWBs) as per RDSO Specification no WD-29-MISC-19 (Rev.1) with tangent length of 100 meters on either side are proposed.
- **The Abstract Cost estimate of 04 Nos. Weighbridges will be about Rs 1.40 Crores @ 35.0 Lakh /weighbridge**.

11.1.1 Derailment/Accident

In case of major accident/ derailment of locomotive and rolling stock inside VPPL area, the services of Railway/DFCCIL will be utilized for Re-railment and VPPL will pay the service charges to Railway/DFCCIL.

To attend minor derailment of any wagon on lead line and inside Port yard, VPPL will procure Re-railing equipment viz MFD, hydraulic & screw jacks, chain pulley block, tools, measuring instruments, gauges etc. **The Cost of Re-railing equipment is estimated to be Rs 4.50 Crore.**

The Mechanical cost is estimated to be Rs. 5.90 Crore.

12 Standards of Construction

12.1.1 Civil Works

The Vadhvan Port Railway connectivity will be constructed adhering to Schedule of Dimensions (SOD) of WDFC. The main features of the standards adopted for the proposed connectivity of Vadhvan Port is:

- Gauge: The gauge of the proposed track will be existing 1676mm (Broad Gauge).
- Gradient: Ruling Gradient of 1 in 200
- Speed Potential: The line is to be classified as 'DFC' route with a maximum speed of 100KMPH on Main/Lead line & 50 KMPH in Port yard.
- Loading Standard: Loading standard for lines nominated for handling Container trains will be as per DFC.
- **Route Length:** 30.593 KM (From Take -off point of Vadhvan Port connectivity at New Palghar station to farthest Dead End of In-Port yard).
- **Total Track Length:** About 136 KM.
- **Rail Joints:** CWR with Butt welding.

12.1.2 Basic Design Parameters

Following are the basic design parameters considered for the railway infrastructure:

The Details of Basic Design Parameter is placed below as **Table 12-1:**

Table 12-1, Basic Design Parameter

1	**Axle Load**	**32.5 tonne loading for bridges and Formation with track structure for 25 tonnes**
2	**Speed Potential**	100 KMPH on Main/Lead line & 50KMPH in Port yard.
3	**Schedule of Dimensions**	As per Standard Schedule of Dimensions for Western Dedicated Freight corridor of Indian Railways - 2013
4	**Ruling Gradient**	1 in 200
5	**Curve**	Maximum degree of Curvature 2.5-degree (700m radius) curve compensation @ 0.04% per degree of curvature
6	**Bridges**	Standard of loading 32.5 tonne axle load with 12 t/m trailing load
7	**Formation**	Formation width: Double line 14.1 m; single line 8.1 m; Blanket thickness as per RDSO GE:014 specification
8	**Loop Lengths**	1500 m
9	**Traction**	Electric: 2x25 KV, 50 Hz AC
10	**Rolling stock** (capability of running on the system)	Locomotive – 9000 HP or 12000 HP Wagon – 25 tonne Axle loads
11	**Signalling**	Signalling: Automatic Block, with Multi Aspect Colour Light Signalling (MACLS) modern signalling system with Automatic Signals at 2 Km interspacing on mainline/lead line, with yard provided with Electronic Interlocking Communication: Mobile Train Radio Communication

12.1.3 Formation

- Formation work will be as per "Guidelines and Specification for Design of Heavy Axle Load (RDSO's specification No. RDSO /2007/GE: 0014)''.

- As per DFC norms, a Formation width of 8.1 m in bank for single line is proposed.
- The sub grade comprising of blanketing layer will be laid with mechanically compacted blanketing material conforming to RDSO's specification No. RDSO/2007/GR: 0011.

12.1.4 Standards of Permanent Way

The specifications for P-Way are detailed below as **Table 12-2:**

Table 12-2, Track Structure Details

Technical Parameters of Track Structure		
1	**Gauge**	1676 mm (BG)
2	**Spacing of Tracks**	
2.1	Minimum Distance: Centre to centre of tracks	6.0 m
3	**Rails**	
3.1	Rails for Mainline and Points and Crossings	UIC 60Kg – 1080 HH to IRS T-12
3.2	Rails for other than Mainline and Points and Crossings	UIC 60Kg – 90UTS to IRS T-12
4	**Point and Crossings**	
4.1	Mainline and running Loops	Zu1-60, 1080HH Rail, 1 in 12 Curved thick web switches with weldable CMS Crossings on PSC sleepers Layout
4.2	Loops and sidings	Zu1-60, 1080HH Rail, 1 in 12 Curved thick web switches with weldable CMS Crossings on PSC sleepers Layout
4.3	Minor loops and sick lines	Zu1-60, 1080HH Rail, 1 in 8.5 Curved thick web switches with weldable CMS Crossings on PSC sleepers Layout
5	**Sleepers**	PSC Monoblock Sleepers 60 Kg with 1 in 20 cant
6	**Sleeper Spacing**	1660 Nos per Km for Mainline and 1540 Nos per Km for sidings
6	**Ballast Cushion**	
6.1	Mainline	350 mm
6.2	Loop and Siding	250 mm
7	**Check Rail Clearance at Level Crossings**	Minimum – 51 mm; Maximum – 57 mm; Minimum depth of space for wheel flange from rail level -38

12.1.5 Road Crossings

There are in all Twenty- six (25) road crossings. The breakup is ROB-02 Nos and RUB 23 Nos. The list of road crossings is listed below as Table 12-3:-

Table 12-3, List of Road Crossings

Bridge No.	Chainage	Particulars	Type of Crossings	Type of Bridge

1	1079.410	1 X 5.5x4.5	Road	RUB
4	3528.280	1 X 5 X6	Road	RUB
6	5176.380	2 X 5 X6	Road	RUB
7	6503.430	2 X 5 X 6	Road	ROB
8	7509.290	2X5X6	Road	ROB
10	9646.700	2 X 5 X6	Road	RUB
12	10650.00	2 X 5 X6	Road	RUB
17	12579.18	2 X 5.0 X6.0	Road	RUB
18	13739.51	2 X 5.0 X6.0	Road	RUB
19	13950.00	2 x 5.0X6.0	Road	RUB
20	14205.00	2 x 5.0 X 6.0	Road	RUB
21	15200.00	2 X 5 X6	Road	RUB
22	16029.43	2 X 5 X 6	Road	RUB
23	16418..48	2 X 5 X6	Road	RUB
24	16976.15	2 X 5.0 X 6.0	Road	RUB
25	17473.00	2 X 5.0 X 6.0	Road	RUB
26	18238.04	2 X 5 X6	Road	RUB
27	18722.23	2 X 5 X6	Road	RUB
28	19523.12	2 X 5 X6	Road	RUB
29	20472.78	2X 5x6	Road	RUB
30	20926.88	2 X 5 X6	Road	RUB
31	21195.14	2 X 5 X6	Road	RUB
32	21786.29	2 X 5 X6	Road	RUB
34	21953.00	2 X 5 X6	Road	RUB
35	22380.79	2X 5 X6	Road	RUB

12.1.6 RFO/ROR

The Details of the RFO/ROR is placed below as **Table 12-4:**

Table 12-4, Details of RFO/ROR

Bridge No.	Chainage	Particulars	Type of Crossings	Type of Bridge
1	11294.71	1X32.45+1x63.7+1x110.4+1x63.7 +1x32.45	DFCC/IR/MRVC Line Crossing	ROR

12.1.7 Approach Trestle

01 No. (Inside Port Yard, 2.60 km. long)

12.1.8 HT Line Crossings

There are Six (6) HT line crossings. The list of the HT line crossings are listed below as **Table 12-5:**

Table 12-5, HT Line Crossings

Details of HT Line Crossings			
Sr. No.	Chainage	Particulars	Type of Crossings
1	2731.42	HT Line	HT Line (220 KV)
2	2731.42	HT Line	HT Line (220 KV)
3	2731.42	HT Line	HT Line (220 KV)
4	2731.42	HT Line	HT Line (220 KV)
5	2731.42	HT Line	HT Line (220 KV)
6	2731.42	HT Line	HT Line (220 KV)

12.1.9 Cross Drainages

There are in all Eight (08) cross drainage. The breakup is Major-03 Nos., Minor – 05 Nos. The list of cross drainage is listed below as **Table 12-6:**

Table 12-6, List of Cross Drainage

Bridge No.	Chainage	Particulars	Type of Crossings	Type of Bridge
2	2496.050	1x2.0X2.0	Nala	Culvert
3	3084.880	1X6.1X4.0	Nala	Culvert
5	3689.280	1X3X6	Nala	Culvert
11	10272.670	1 X 12.2 PSC Girder	Canal	Major Bridge
13	10966.36	1 X 12.2 PSC Girder	Canal	Major Bridge
15	12240.38	1 X 6.0 X5.0	Nala	Culvert
16	12445.00	1 x 2.0X 4.0	Nala	Culvert
29	21096.02	3 X 6.0	Nala	Major Bridge

12.1.10 Curvatures

- There are in all 34 Nos. of Curvatures on Main/Lead line (From Holding yard to Proposed Railway Port Gate) (Max. 2.18 Degree). The list of Curvatures is listed below as **Table 12-7:**

Table 12-7, List of Curvatures

Sr. No.	Start CH	End CH	Radius (m)	Degree of Curvature	Tangent Length (m)	Curve Length (m)
1	4140.19	4968.68	500	3.50	545.060	828.490
2	4168.29	4963.64	480	3.60	523.257	795.350
3	5248.87	6147.03	875	2.00	545.060	898.160
4	5252.26	6150.42	875	2.00	545.060	898.160
5	7441.23	8549.67	875	2.00	642.539	1108.440
6	7445.63	8554.07	875	2.00	642.539	1108.440
7	10711.29	10761.12	1750	1.00	24.916	49.830
8	10711.23	10761.19	1750	1.00	24.984	49.960
9	10825.31	10875.1	1750	1.00	24.894	49.790

10	10825.21	10875.21	1750	1.00	25.005	50.000
11	11534.38	11582.43	1750	1.00	24.025	48.050
12	11534.26	11582.27	1750	1.00	24.003	48.010
13	11652.25	11700.23	1750	1.00	23.991	47.980
14	11652.13	11700.18	1750	1.00	24.025	48.050
15	11959.52	12042.75	1000	1.75	41.64	83.23
16	11959.74	12042.99	1000	1.75	41.65	83.25
17	12383.44	12509.63	1000	1.75	63.18	126.19
18	12383.32	12509.51	1000	1.75	63.18	126.19
19	12812.58	12920.25	1000	1.75	53.89	107.67
20	12812.51	12920.18	1000	1.75	53.89	107.67
21	14121.48	14335.39	1000	1.75	107.36	213.91
22	14121.09	14335.00	1000	1.75	107.36	213.91
23	14849.33	15059.72	1000	1.75	105.58	210.93
24	14850.22	15059.72	1000	1.75	105.58	210.93
25	16222.35	16456.11	1000	1.75	117.41	233.76
26	16222.28	16456.03	1000	1.75	116.81	233.75
27	19080.06	19375.99	800	2.18	146.68	295.93
28	19080.40	19376.47	800	2.18	149.68	295.93
29	20061.47	20841.12	1750	1.00	396.40	779.65
30	20062.32	20841.97	1750	1.00	396.40	779.65
31	21551.22	21665.29	1750	1.00	57.05	114.07
32	21550.51	21664.58	1750	1.00	57.05	114.07
33	21933.57	22201.92	875	2.00	135.24	268.35
34	21933.93	22202.28	875	2.00	135.24	268.35

- There are in all 10 Nos. of Curvatures inside Port yard (From Railway Port Gate to Dead end of Port Yard). Maximum degree of curvature is 4 Degree. The list of curvatures is listed below as **Table 12-8:**

Table 12-8, List of Curvatures inside port yard

Sr. No.	Start CH	End CH	Radius (m)	Degree of Curvature	Tangent Length (m)	Curve Length (m)
35	22702.55	22911.24	437.5	4.00	107.443	210.720
36	22977.75	22703.91	437.5	4.00	107.443	210.720
37	23191.85	23398.81	437.5	4.00	106.504	208.940
38	23190.16	23397.12	437.5	4.00	106.504	208.940
39	23122.06	23299.14	500	3.50	122.793	240.820
40	24708.58	24902.62	583.33	3.00	97.849	193.890
41	24709.00	24901.00	583.33	3.00	97.849	193.890
42	27762.80	28920.75	875	2.00	681.459	1157.950
43	27646.00	28801.85	875	2.00	681.459	1157.950
44	27521.05	28646.26	800	2.19	678.296	1125.210

13 Detailed Cost Estimate

13.1 Cost Estimate (Phase-1)

The Cost Estimate of **Phase-1** for Railway connectivity of 'Greenfield Vadhvan Port' to WDFC through one RFO/ROR is estimated to be **Rs. 1276.53 Crore.**

Summary of Detailed Cost Estimate of the Project **(Phase-1)** is enumerated below as Table 13-1**:**

Table 13-1, Summary of Detailed Cost Estimate (Phase-1)

Summary of Detailed Cost Estimate (Phase-1)								
#	**Description**		**Amount (In Rs.)**			**Amount (In Cr.)**		
1	2		3			4		
			Phase 1			**Phase 1**		
			From Take-off to Vadhvan Port Gate	**Inside Port Gate (Track and OHE)**	**Total for Phase 1 Traffic**	**From Take-off to Vadhvan Port Gate**	**Inside Port Gate (Track and OHE)**	**Total for Phase 1 Traffic**
A	Permanent way materials							
i	Supplying Rails.		68,69,41,980	83,70,72,060	1,52,40,14,040	68.69	83.71	152.40
ii	Supplying of PSC line sleepers.		36,35,93,130	46,54,18,380	82,90,11,510	36.36	46.54	82.90
iii	Point & Crossings		8,18,02,270	20,32,66,250	28,50,68,520	8.18	20.33	28.51
iv	Fittings		8,08,43,323	10,62,43,905	18,70,87,227	8.08	10.62	18.71
v	Supply of Hard Stone Ballast.		22,47,72,200	28,66,34,420	51,14,06,620	22.48	28.66	51.14
	Sub Total of Permanent way material (A)		**1,43,79,52,903**	**1,89,86,35,015**	**3,33,65,87,917**	**143.80**	**189.86**	**333.66**
B	Permanent way linking							
i	Cost for Linking, Ballasting, Welding etc.		12,52,40,040.00	16,09,67,400.00	28,62,07,440	12.52	16.10	28.62
	Sub Total of Permanent way works (A)+(B)		**1,56,31,92,943**	**2,05,96,02,415**	**3,62,27,95,357**	**156.32**	**205.96**	**362.28**
C	Formation							
i	Earthwork Formation & Miscellaneous		1,87,57,23,110	-	1,87,57,23,110	187.57	-	187.57
ii	Side Drain		40,26,89,960	-	40,26,89,960	40.27	-	40.27
iii	Shifting of HT Towers		2,00,00,000	-	2,00,00,000	2.00	-	2.00
	Total for Formation (C)		**2,29,84,13,070**	**-**	2,29,84,13,070	229.84	-	229.84
	Total for P-way & Earthwork (A+B+C)		**3,86,16,06,013**	**2,05,96,02,415**	**5,92,12,08,427**	**386.16**	**205.96**	**592.12**

D	Rail Fly Over (ROR)		1,07,18,23,000	-	1,07,18,23,000	107.18	-	107.18
E	Major & Minor Bridges, RUB,ROB		1,32,33,02,874	-	1,32,33,02,874	132.33	-	132.33
F	Retaining wall for West side of ROR		54,33,64,519	-	54,33,64,519	54.34	-	54.34
G	Service Buildings		2,44,75,000	-	2,44,75,000	2.45	-	2.45
	Total Cost for Civil Works (A+B+C+D+E+F+G)		**6,82,45,71,406**	**2,05,96,02,415**	**8,88,41,73,821**	**682.46**	**205.96**	**888.42**
H	OHE Works		78,28,16,580	44,23,67,920	1,22,51,84,500	78.28	44.24	122.52
I	Electric- General Supply,		2,50,00,000	1,50,00,000	4,00,00,000	2.50	1.50	4.00
J	Signal & Telecommunication (including inside Port Yard)		96,57,88,500		96,57,88,500	96.58	-	96.58
K	Mechanical			5,90,00,000	5,90,00,000	-	5.90	5.90
L	**Total Cost (A+B+C+D+E+F+G+H+I+J+K)**		**8,59,81,76,486**	**2,57,59,70,335**	**11,17,41,46,821**	**859.82**	**257.60**	**1,117.41**
M	Provisional Sum (To cover Railway Departmental Charges, Engineering Designs, Environmental Related Works, Price Escalation, Taxation & other items)	12 %	1,03,17,81,178	30,91,16,440	1,34,08,97,619	103.18	30.91	134.09
N	**Total Project Cost (L+M)**		**9,62,99,57,665**	**2,88,50,86,775**	**12,51,50,44,439**	**963**	**289**	1,251.50
O	Contingency Charges	2%	19,25,99,153	5,77,01,735	25,03,00,889	19.26	5.77	25.03
P	**Gross Project Cost (N +O)**		**9,82,25,56,818**	**2,94,27,88,510**	**12,76,53,45,328**	**982.26**	**294.28**	**1,276.53**

13.2 Cost Estimate (Phase-2)

The Cost Estimate of **Phase-2** for Railway connectivity of 'Greenfield Vadhvan Port' to WDFC through one RFO/ROR is estimated to be **Rs. 108.08 Crore.**

Summary of Detailed Cost Estimate of the Project **(Phase-2)** is enumerated below as Table 13-2**:-**

Table 13-2, Summary of Detailed Cost Estimate (Phase-2)

Summary of Detailed Cost Estimate (Phase-2)				
#	**Description**		**Amount (In Rs.)**	**Amount (In Cr.)**
1	2		3	4
			Phase 2 (Only Inside Port Gate)	**Phase 2 (Only Inside Port Gate)**
			Additional for Phase 2 Traffic	**Additional for Phase 2 Traffic**
A	Permanent way materials			
i	Supplying Rails.		26,04,69,800	26.05
ii	Supplying of PSC line sleepers.		15,15,11,030	15.15
iii	Point & Crossings		7,43,65,700	7.44
iv	Fittings		3,85,98,210	3.86
v	Supply of Hard Stone Ballast.		9,32,04,540	9.32
	Sub Total of Permanent way material (A)		**61,81,49,280**	**61.81**
B	Permanent way linking			
i	Cost for Linking, Ballasting, Welding etc.		5,27,73,960.00	5.28
	Sub Total of Permanent way works (A)+(B)		**67,09,23,240**	**67.09**
C	Formation			
i	Earthwork Formation & Miscellaneous		-	-
ii	Side Drain		-	-
iii	Shifting of HT Towers		-	-
	Total for Formation (C)		**-**	-
	Total for P-way & Earthwork (A+B+C)		**67,09,23,240**	**67.09**
D	Rail Fly Over (ROR)		-	-
E	Major & Minor Bridges, RUB, ROB		-	-
F	Retaining wall for West side of ROR		-	-
G	Service Buildings		-	-
	Total Cost for Civil Works (A+B+C+D+E+F+G)		**67,09,23,240**	**67.09**
H	OHE Works		7,50,00,000	7.50
I	Electric- General Supply,		-	-
J	Signal & Telecommunication		20,00,00,000	20.00
K	Mechanical		-	-
L	**Total Cost (A+B+C+D+E+F+G+H+I+J+K)**		**94,59,23,240**	**94.59**
M	Provisional Sum (To cover Railway Departmental Charges, Engineering Designs, Environmental Related Works, Price Escalation, Taxation & other items)	12%	11,35,10,789	11.35

N	**Total Project Cost (L+M)**		**1,05,94,34,029**	**106**
O	Contingency Charges	2%	2,11,88,681	2.12
P	**Gross Project Cost (N +O)**		**1,08,06,22,709**	**108.06**

13.3 Project Cost (Both Phases)

As per the details provided above, the breakup of the project cost up to the Port Gate and beyond are as follows:

(4) Project Cost up to the Port Gate (included in Phase 1 of the Project) – Rs. 982.26 Crores

This includes cost of Civil, OHE, Mechanical, etc. from the WDFC junction / take off from New Palghar station to the Port Gate. However, the cost of Control Systems i.e., S&T costs include the cost of S&T infrastructure inside the gate too since for the efficacy of the whole railway infrastructure a seamless operational system will be necessary. This cost also include the assessed cost of Railway Fly Over (ROR/RFO) at New Palghar.

(5) Project Cost inside the Port Gate:

a. Under Phase 1 – Rs. 294.28 Crores
b. Under Phase 2 – Rs. 108.06 Crores

Inside the Port Gate – Total for Phase 1 and Phase 2 **– Rs 402.34 Crores**

(6) Total Project Cost

Adding the two, the final project cost, including Phase 1 and Phase 2, is **Rs 1384.60 Crores**

13.3.1 Notes On Cost Estimate

(1) Land Cost is not included in these estimates.
(2) The assessment of the cost of ROR (including its approaches) and other drainage & road crossings has been made on the basis of preliminary assessment.
(3) The In-Port railway tracks have been considered as 'Ballasted Tracks'.
(4) Inside the port yard, the earthwork/ Bridges/Culverts/Approach Trestle cost not included presuming that 'Ready' formation will be made available for Railway infra.
(5) The Base Year for the above estimate has been considered as 2021.

Detailed Cost estimate of Civil Works is attached at **Section 14.1** of this Report.

14 Annexures

14.1 Annexure-1: - Detailed Cost Estimate of Civil Works

Supply of Way Material									
Sr. No.	**Description of Work**	**Unit**	**Quantity**			**Rate (Rs.)**	**Amount (In Rs.)**		
			Phase 1				**Phase 1**		
			From) New Palghar to Gate	**From gate to In Port Yard**	**Total of Phase 1**		**From) New Palghar to Gate**	**From gate to In Port Yard**	**Total of Phase 1**
	RAILS								
1	Manufacturing and supplying of 60**Kg,** Rails **(HH) including flash butt welding.** Item excluding transportation of Rail to site with all leads & lifts etc. complete.	MT	7,723.80	9,412.20	17,136.00	86,134	66,52,83,262	81,07,12,229	1,47,59,95,491
1a	Manufacturing and Supplying of 52 **Kg,** Check **Rails.** Item excluding transportation of Rail to site with all leads & lifts etc complete.	MT	387.00	471.00	857.00	55,966	2,16,58,709	2,63,59,824	4,79,62,567
	SLEEPERS								
2	Manufacturing and Supply of **60 Kg PSC Sleepers (Ordinary Sleepers)** .Item excluding transportation of material to site with all leads & lifts etc complete.	Nos.	1,06,846.00	1,30,203.00	2,37,050.00	3,238	34,59,48,650	42,15,74,528	76,75,26,416
3	Manufacturing and Supply of **60 Kg. PSC Sleepers complete set for 1 in 12 Fan Shaped turnou**ts	Nos.	33.00	82.00	115.00	5,34,681	1,76,44,473	4,38,43,842	6,14,88,315
4	Manufacturing and Supply of **60 Kg. PSC Sleepers complete set for 1 in 12 derailing switches for 60 kg rail section.**	Per set	1.00	-	1.00	1,48,061	1,48,061	-	1,48,061
	Point & Crossings								
5	Supplying, Points & Crossing **60 Kg 1 in 12 including leading loading, unloading and stacking at site**	Nos.	33.00	82.00	115.00	24,78,857	8,18,02,270	20,32,66,246	28,50,68,515

6	Manufacturing and Supply of **1 in 8½ derailing switch complete set for 60 kg rail** section on 60 Kg.	Per set	1.00	-	1.00	4,94,816	4,94,816	-	4,94,816
	Fittings								
7	Supply of **Fish plate 60 Kg** with its Nuts and Bolts miscellaneous	Pairs	128.71	156.77	286.00	8,237.50	10,60,253	12,91,420	23,55,925
8	Supply of **Fish bolts & nuts 60 Kg** incuding transportation to site of work with contractors labour, tools, transport, fuel and loading, unloading etc complete.	Nos.	773.00	941.00	1,716.00	208.75	1,61,364	1,96,434	3,58,215
9	Manufacturing and Supply of **SEJ for long welded rails BG 60 Kg .**	Set	30.65	70.00	100.65	2,52,186	77,28,343	1,76,53,038	2,53,81,380
10	Supplying, of **fastenings** for 60Kg PSC line sleeper with60 Kg rails, including transport, leading, loading, unloading and stacking at site								
a	Manufacturing and Supply of **Grooved Rubber Sole Plates 6mm thick** to suit 60 kg PSC sleeper	Nos.	2,24,377.00	2,73,427.00	4,97,805.00	63.75	1,43,04,034	1,74,30,971	3,17,35,069
b	Manufacture & supply of **GFN Liners**	Nos.	4,50,487.00	5,51,159.00	10,01,700.00	43.75	1,97,08,806	2,41,13,206	4,38,24,375
c	Manufacturing and Supply of **Elastic Rail clips (ERC)** flat toe Mk.III to suit 60 kg PSC sleeper	Nos.	4,50,487.00	5,51,159.00	10,01,700.00	82.50	3,71,65,178	4,54,70,618	8,26,40,250
d	Manufacturing and Supply of **Elastic Rail clips (ERC) 'J' type** to suit 60 kg PSC sleeper	Nos.	773.00	941.00	1,716.00	93.75	72,469	88,219	1,60,875
11	Supply and Delivery (at site) of **Hard stone Ballast of 40-65 mm size**, clean angular, hard and durable track ballast	Cum	1,62,349.00	2,07,031.00	3,69,380.00	1,384.50	22,47,72,191	28,66,34,420	51,14,06,610
	Total cost of Permanent Way Material						**1,43,79,52,876**	**1,89,86,34,993**	**3,33,65,46,880**

P-Way Linking									
Sr. No.	**Description of Work**	**Unit**	**Quantity**			**Rate (Rs.)**	**Amount (In Rs.)**		
			Phase 1				**Phase 1**		
			From) New Palghar to Gate	**From gate to In Port Yard**	**Total of Phase 1**		**From) New Palghar to Gate**	**From gate to In Port Yard**	**Total of Phase 1**
	Cushion work								
1	**Picking of stone ballast** from ballast depots, leading, **spreading** uniformly on formation as to achieve standard profile	Cum	1,62,349.00	2,07,031.00	3,69,380.00	220	3,57,16,780	4,55,46,820	8,12,63,600
2	Rolling of the Ballast carpet	RMT	61,300.00	74,700.00	1,36,000.00	25	15,32,500	18,67,500	34,00,000
	Track Linking								
3	**Handling, assembling, linking and laying of Railway Track with 60 Kg Rails** of all lengths on Monoblock PRC sleepers on straight, curves, bridges and level crossings etc. including cutting & drilling of holes in rails wherever required & fixing fish plated joint fittings, fixing all standard fittings and fastenings by 'Mechanized' process.	Track Km.	61.30	74.70	136.00	8,12,500	4,98,06,250	6,06,93,750	11,05,00,000
4	**Assembling, laying and linking of BG 60 kg, points and crossings 1 in 12** LH/RH by 'Mechanized' process with GFN Liners & all fittings and fastenings, curved switches with CMS crossing on 60 Kg. PSC sleeper fan shaped layout	Nos.	33.00	82.00	115.00	59,316	19,57,436	48,63,933	68,21,369
	Welding of Joints								
5	Welding of rail joints of 60 kg rail with Flash Butt welding / Thermit **Welding (SKV)** process	Nos.	787.09	959.15	1,747.00	8,125.00	63,95,123	77,93,078	1,41,94,375
6	**Drilling of holes** 32mm/ 28mm/ 26.5mm dia. In 60 kg rails at site where ever necessary to proper alignment and chamfering with contractors' labours, tools and plants with all leads, lifts, and track crossings complete as	Nos.	772.26	940.64	1,716.00	68.75	53,093	64,669	1,17,975

	directed by Engineer-In-Charge.								
7	**Cutting of 60 Kg** rails in main track/yard or cess, with abrasive rail cutter to proper square, truly vertical with contractor's labours, tools and plants with all leads lifts, track crossings complete as directed by Engineer-In-Charge.	Nos.	137.90	167.97	306.00	185.00	25,512	31,075	56,610
8	**Fabricating, erecting and fixing in position snag dead end** as per approved plan for BG track with bider's materials as directed by Engineer/Consultant -in-charge.	Nos.	5.00	14.00	19.00	1,87,500.00	9,37,500	26,25,000	35,62,500
9	**Fabrication, Supply, Transportation & Fixing of various sign boards v**iz. Speed indicators, "STOP"/DANGER (Caution) Sign Boards, WHISTLE (W/L) Sign Boards, termination board, Level Crossing indicator boards etc. All work shall be completed as directed by Engineer/Consultant -in-charge.	Nos.	50.00	50.00	100.00	11,875.00	5,93,750	5,93,750	11,87,500
10	Supplying & Casting and fixing RCC, Curve, Gradient, Kilometre, Fouling mark post and Bridge tablets as per approved drawing duly painted and lettered as per standard practice with contractor's materials, machinery and labour, complete as per specifications.	Nos.	20.00	60.00	70.00	10,625.00	2,12,500	6,37,500	7,43,750
	Through Packing								
11	**Through Machine packing of Pre-tamping and post tamping works, reconditioning of tamping tools, and providing all consumables for first & Second -round of packing by railway's/Contractor heavy on track tampers and dynamic track stabliser of straight/curved main line and loop line track, sidings,** Note: The unit of measurement "RMT"								

	should be considered as "Track Metre".								
a	First round packing	RMT	61,300.00	74,700.00	1,36,000.00	53.75	32,94,875	40,15,125	73,10,000
b	Second round Packing	RMT	61,300.00	74,700.00	1,36,000.00	43.75	26,81,875	32,68,125	59,50,000
12	**Through Machine packing of Assembly and laying of Points and Crossings 1 in 16, 1 in 12, 1 in 8.5, under line block by Railway's/Contractor T-28 (Ameca) Machine**						-		
a	First round packing	Each	33.00	82.00	115.00	25,268.75	8,33,869	20,72,038	29,05,906
b	Second round Packing	Each	33.00	82.00	115.00	25,268.75	8,33,869	20,72,038	29,05,906
13	Transportation of rails , sleepers within project area , wherever required from Stores to any location of project area.	MT	39,640.11	48,317.28	87,957.00	513.75	2,03,65,104	2,48,23,000	4,51,87,909
	Total cost of Permanent Way Execution						**12,52,40,036**	**16,09,67,399**	**28,61,07,400**
	Total Cost of Permanent Way Works.						**1,56,31,92,912**	**2,05,96,02,392**	**3,62,26,54,280**

Summary of Formation		
Sr. No.	**Description**	**Amount (Rs.)**
1	Earthwork	1,87,07,23,104
2	Miscellaneous Works	50,00,000
	Total Cost of Formation (In Rs.)	**1,87,57,23,104**
	Total Cost of Formation (In Cr.)	**187.57**

Estimate of Earthwork					
No.	**Description**	**Unit**	**Quantity**	**Rate (Rs.)**	**Amount (In Rs.)**
1	Earthwork in **Filling in embankment**, to proper profile, levels, slopes, grade and camber. The rates shall include transportation of earth, all leads and lifts, royalty, any other taxes, ascents, descents, crossing of track or any other obstructions, handling, re-handling, leading, loading, unloading, spreading in layers, dressing as per RDSO specifications.	Cum	38,97,916	345	1,34,47,80,965
	(a) With contractor's own earth excavated from approved borrow areas. (Royalty if any shall be paid by Contractor).				
2	**Earthwork in cutting** (classified) in formation, trolley refuges, side drains, level crossing approaches, platforms, catch water drains, diversion of nallah & finishing to required dimension and slopes to obtain a neat appearance to standard profile as per directions of the Engineer-in-Charge.				
	Note - (i) All usable earth arising from cut spoils shall be led into bank formation and Unusable spoils shall be dumped / stacked (ii) All hard rock /and boulders not fit for filling will be stacked by the contractor and will be property of the Railways.				
2(a)	In all conditions and classifications of soil except Rock	Cum	38,436	267	1,02,72,104
2 (b)	Soft rock not requiring blasting in all conditions	Cum	38,436	340	1,30,73,482
2 (c)	In rock and very hard rock with hammer / chisel / pavement breaker etc. where blasting is not permitted due to special circumstances	Cum	38,436	567	2,17,76,837
3	Supplying **blanketing material** including spreading, watering, Compaction in layers etc.	Cum	2,43,359	1,800	43,80,46,374
4	**Turfing / planting,** including all lead & lift and watering as required until properly rooted with.	Sqm	5,81,032	68	3,94,29,445

5	Leading cut spoil				
	Upto 1 KM	Cum		9.00	-
	Upto 5 KM	Cum	38,436	9.0	3,45,920
	Upto 8 KM	Cum	76,871	9.0	6,91,841
6	Extra for mechanical compaction of cut spoil	Cum	76,871	30	23,06,135
				Total	1,87,07,23,104
	Total Cost of Earthwork (In Rs.)				**1,87,07,23,104**

Side Drain					
Sr. No.	**Description**	**Unit**	**Quantity**	**Rate (Rs.)**	**Amount (Rs)**
1	Side Drain	Rm	44,155	9,120	40,26,89,952
		Total of Side Drain			**40,26,89,952**

Shifting of HT Towers					
Sr. No.	**Description**	**Unit**	**Quantity**	**Rate**	**Amount (Rs)**
2	Shifting of HT Tower (2 numbers)	Nos.	2	1,00,00,000.00	**2,00,00,000.00**

Rail Fly Over/Rail Over Rail (RFO/ROR)			
Sr. No.	Description of Work	Unit	Amount (Rs.)
1	**2**	**3**	**4**
			Option 2B
A	**Civil Work**		
i	Site Clearance and Dismantling, Temporary arrangement, Preparatory Work (Pile Testing), Survey etc.)	Lumpsum	2,00,00,000.00
ii	Earthwork (For foundation, approaches)	cum	4,79,23,000.00
iii	Foundation (Pile, Pile Cap)		7,19,76,000.00
iv	Sub Structure (Pier, Pier Cap)	Cum	8,81,71,000.00
v	Super Structure (Composite Girder)	Cum	65,52,000.00
vi	Super Structure- Supplying, Fabricating, Assembling of Steel Girder including Launching complete	MT	79,63,22,000.00
vii	Bearing	number	60,00,000.00
viii	Other (Shuttering, Inspection Platform, Handrail etc.)		38,62,000.00
viii	Miscellaneous	Lumpsum	1,00,00,000.00
	Total Cost of Civil Work (A)		**1,05,08,06,000.00**
B	**Contingency**		2,10,17,000.00
Total Civil Construction Cost (A+B)			**1,07,18,23,000.00**
C	**Other Charges**		
i	Preliminary & Establishment Cost		-
ii	Design & Detailed Engineering		-
iii	Rail Safety		-
iv	Supervision		-
	TOTAL Cost of C		**-**
	TOTAL Project Cost (A+B+C)		**1,07,18,23,000.00**
D	**Environmental Mitigation Measures**		-
E	**Utility Shifting**		-
	Total Capital Cost of the Project (A+B+C+D+E) rounded off		**1,07,18,23,000.00**

Bridge Cost Estimate											
					SPAN						
Bridge No.	**Chainage**	**Particulars**	**Type of Crossings**	**Type of Bridge**	**No**	**Span**	**Height**	**Qty.**	**Unit**	**Rate (Rs)**	**Amount (Rs.)**
1	1079.410	1 X 5.5	Road	RUB	1	5.50	4.50	44.55	sqm	1,25,000	55,68,750
			Lowering + Road					3913.44	m3	267	77,93,091
			Retaining wall for approach					674.82	m	70,000	4,72,37,412
2	2496.050	1x2.0X2.0	Nala	Culvert	1	2.0	2.0	114.89	sqm	95,000	1,09,14,867
3	3084.880	1X6.1X4.0	Nala	Culvert	1	6.1	4.0	364.80	sqm	95,000	3,46,55,645
4	3528.280	1 X 5 X6	Road	RUB	1	5.0	6.0	230.79	sqm	1,25,000	2,88,48,333
5	3689.280	1X3X6	Nala	Culvert	1	3.0	6.0	120.62	sqm	95,000	1,14,58,900
6	5176.380	2 X 5 X6	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
			Lowering + Road					9683.06	m3	267	66,90,976
			Retaining wall for approach					410.56	m	70,000	2,87,39,200
7	6503.430	2 X 5.0 X 6	Road	ROB	2	5.0	6.0	141.00	sqm	2,00,000	2,82,00,000
			Filling + Road					11145.73	m3	300	1,17,89,585
			Retaining wall for approach					844.59	m	70,000	5,91,21,067
8	7509.290	2X5X6	Road	ROB	2	5.0	6.0	141.00	sqm	2,00,000	2,82,00,000
			Filling + Road					1444.00	m3	300	34,73,200
			Retaining wall for approach					304.00	m	70,000.00	2,12,80,000
9	8679.400	1 X 12.2	Road + Canal	Major Bridge	1	12.2		172.02	sqm	2,00,000	3,44,04,000
10	9646.700	2 X 5 X6	Road	RUB	2	5.0	6.0	189.05	sqm	1,25,000	2,36,31,667
11	10272.670	1 X 12.2 PSC Girder	Canal	Major Bridge	1	12.2		172.02	sqm	2,00,000	3,44,04,000
12	10650.00	2 X 5 X6	Road	RUB	2	5.0	6.0	191.69	sqm	1,25,000	2,39,61,667
13	10966.36	1 X 12.2 PSC Girder	Canal	Major Bridge	1	12.2		172.02	sqm	2,00,000	3,44,04,000
14	**11294.71**	**1X32.45+1x63.7+1x110.4+1x63.7+1x32.45**	**DFCC/IR/ MRVC Line Crossing**	**ROR**							-
15	12236.550	1 X 6.0	Nala	Culvert	1	6.0	6.0	219.40	sqm	95,000	2,08,43,000
16	12437.690	1 X 2.0	Nala	Culvert	1	2.0	6.0	66.31	sqm	95,000	62,99,133
17	12579.180	2 X 5.0 X6.0	Road	RUB	2	5.0	6.0	195.53	sqm	1,25,000	2,44,41,667
18	13739.510	2 X 5.0 X6.0	Road	RUB	2	5.0	6.0	203.53	sqm	1,25,000	2,54,41,667
19	13950.000	2 X 5.0X6.0	Road	RUB	2	5.0	6.0	199.47	sqm	1,25,000	2,49,33,333
20	14205.000	2 X 5.0X6.0	Road	RUB	2	5.0	6.0	171.25	sqm	1,25,000	2,14,06,667
21	15200.000	2 x 5.0 X 6.0	Road	RUB	2	5.0	6.0	16.57	sqm	1,25,000	20,71,667
			Lowering + Road					471.47	m3	267	1,25,882

			Retaining wall for approach					173.71	m	70,000	1,21,59,466
22	16029.430	2 X 5.0 X6.0	Road	RUB	2	5.0	6.0	124.29	sqm	1,25,000	1,55,36,667
23	16418.480	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	147.53	sqm	1,25,000	1,84,41,667
24	16976.150	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	181.13	sqm	1,25,000	2,26,41,667
25	17473.000	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	233.73	sqm	1,25,000	2,92,16,667
26	18238.040	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
			Lowering + Road					2073.28	m3	267	5,53,567
			Retaining wall for approach					364.27	m	70,000	2,54,98,666
27	18722.230	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
28	19523.120	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	288.15	sqm	1,25,000	3,60,18,590
29	20472.780	2 X 5.0 X6.0	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
			Lowering + Road					8407.67	m3	267	22,44,847
			Retaining wall for approach					733.55	m	70,000	5,13,48,266
30	20926.880	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
			Lowering + Road					2432.26	m3	267	6,49,413
			Retaining wall for approach					394.54	m	70,000	2,76,18,051
31	21195.100	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
			Lowering + Road					180.04	m3	267	48,071
			Retaining wall for approach					107.34	m	70,000	75,14,051
32	21267.100	3 X 6.0	Nala	Major Bridge	3	6.0		253.80	sqm	2,00,000	5,07,60,000
33	21786.290	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
			Lowering + Road					10459.52	m3	267	27,92,692
			Retaining wall for approach					818.17	m	70,000	5,72,72,205
34	21953.000	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
			Lowering + Road					6285.24	m3	267	16,78,158
			Retaining wall for approach					634.24	m	70,000	4,43,96,512
35	22380.790	2 X 5.0 X 6.0	Road	RUB	2	5.0	6.0	141.00	sqm	1,25,000	1,76,25,000
			Lowering + Road					3407.81	m3	267	9,09,884
			Retaining wall for approach					467.01	m	70,000	3,26,90,789
			Road	Road Diversion	1			1602.03	m	20,000	3,20,40,600

			From CH: 4.000 to 10.000 per km 2 nos. culverts are considered	Culvert	12	2.0	2.0	866.40	sqm	95,000	8,23,08,000
										TOTAL	**1,32,33,02,874**

Reinforced Earth (RE) Wall					
#	**Description**	**Qty.**	**Unit**	**Rate (Rs.)**	**Amount (Rs)**
1.00	Reinforced Earth (RE) Wall	16,302.57	Sqm	33,330	54,33,64,519
					54,33,64,519

Cost of Service Buildings, Staff Quarters					
Sl.	**Description of Items**	**Unit**	**Quantity**	**Rate**	**Amount**
2	Construction of Yard building at In-Port yard/Holding Yard which includes office, commercial staff rooms, Carriage and Wagon store room, Crew rest room, Cabins and Toilet block, panel room	Sqm.	1000.00	23,354	2,33,54,000
3	Weigh-Bridge Rooms	Sqm.	48	23,354	11,20,992
	Total				**2,44,74,992**

14.2 Annexure-2 Detailed Estimate of S&T Works

SCHEDULE-J	
Summary of Cost Estimate for Signal and Telecommunication	
Particular	**Amount (Rs.)**
	Phase 1
Augmentation/Modification at New Palghar	8,79,85,700.00
S&T Cost for Holding Yard to Dead End of Port Yard	87,78,02,800.0
Total S&T Cost	**96,57,88,500.00**
Total S&T Cost (In crore)	96.58

Estimate of Signaling and Telecom works for Modification/Alteration at New Palghar						
Sr. No	**Item**	**unit**	**Qty**	**Rate (in Lakhs)**	**Amount (in Lakhs)**	**item no of RVNL's 2018**
1	Electronic interlocking at Stations including VDU incl relays, KLCR, fuses, Furniture, fuse change over, indoor cables, throughs, relay racks, CT rack, earthing, lighting protection and all other accessories for installation of EI	EI unit	1	250	250	36001 - 36005,38604, 38901 - 38907,40001, 40001 - 40007, 38301, 38351 - 38364,38401 - 38411, 38451 - 38458, 38801 - 38803,38401-38411, 39301 - 39310, 39451 - 39463, 39801, 39802
4	IPS at stations including indoor power cables, EI, Relay huts and ALH	NO	1	20	20	36001 - 36004,38604, 38901 - 38907,40001, 40001 - 40007,38301, 38351 - 38364,38401 - 38411, 38451 - 38458, 38801 - 38803,39301 - 39310, 39451 - 39463, 39801, 39802,38401-38411
5	Datalogger and other HMU with all accessories	NO	1	12	12	36001 - 36003,38604, 38901 - 38907,40001, 40001 - 40007,38301, 38351 - 38364,38401 - 38411, 38451 - 38458, 38801 - 38803,39301 - 39310, 39451 - 39463, 39801, 39802, 38401-38411
6	outdoor cable 12 core	KM	40	2.7	108	38601,38604,
7	outdoor cable 6 Quad	KM	13	3.3	42.9	38503
8	OFC cable along with HDPE duct (for signalling and telecom)	KM	3	1.5	4.5	37204
9	Point Machine	Nos	19	1.76	33.44	38651
10	Main Signal with base unit & ladder, route and dependant shunt	Nos	16	0.75	12	38657+ 40101
11	Shunt signal with base and unit	Nos	2	0.25	0.5	38811
12	DP/MDP/SDP/HASSDAC	DP	30	9	270	36102 divided by 5 (as 36102 is for 5 DP)

13	Location Box (apparatus cases) including Hylum sheet and Terminals	Nos	40	0.5	20	38821 plus 38824- 400 nos
14	LED of Main Signal	Nos	90	0.15	13.5	38759
15	LED Shunt Signal	Nos	35	0.1	3.5	38760
	Cost of Supplies in INR Lakhs				**790.34**	
Execution and Civil Works						
1	Civil works for ALH /RH	Per ALH/ RH	0	8	0	
2	Civil works for Station bldg & A, B &Port Cabins				0	
3	Trenching, cable laying, OFC blowing including Cable route marker, GI pipes, track crossing DWC pipe related activity (one for signalling and one for Telecom)	KM	5	3	15	38701+ 39651+ 39655
4	Indoor Installation of EI, IPS, VDU and other related activities for Stations	NO	1	15	15	39001 - 39003, 39451 - 39463,39501,39502, 39951,39952
5	Indoor Installation of EI, IPS, VDU and other related activities for ALH	NO	0	12	0	39001 - 39003, 39451 - 39463,39501,39502, 39951,39952
6	Outdoor installation like point machines, MSDAC, Signals, earthing, Loc. boxes, etc	NO	0	50	0	39101 - 39103, 39601 - 39603, 39951,39952
7	Outdoor installation like MSDAC, Signals, earthing etc per ALH	NO	0	30	0	39101 - 39103
8	Other misc items like painting, security of materials, stores, etc.. Incl station and ALH per unit	NO	1	20	20	39901-39909
9	Contingencies (5% of supplies)	LS	5%		39.52	
	Total Execution cost in Lakhs				**89.5**	
	Total For Palghar				**879.9**	

Cost Estimate of Signalling and Telecom works from Holding Yard to Dead end of Port Yard						
Sr. No	**Item**	**unit**	**Qty**	**Rate (in Lakhs)**	**Amount (in Lakhs)**	**Rate Reference is 35% above RVNL Schedule rates of 2018 (RVNL SOR S. no. referred)**
1	Electronic interlocking at Stations including VDU incl relays , KLCR, fuses , Furniture, fuse change over, indoor cables, throughs, relay racks, CT rack , earthing , lighting protection and all other accessories for installation of EI	EI unit	1	400	400	36001 - 36005,38604, 38901 - 38907,40001, 40001 - 40007, 38301, 38351 - 38364,38401 - 38411, 38451 - 38458, 38801 - 38803,38401- 38411, 39301 - 39310, 39451 - 39463, 39801, 39802
2	Electronic interlocking at ALH huts incl relays , KLCR, fuses , Furniture, indoor cables, throughs, relay racks, CT Rack, fuse changeover, earthing , lighting protection and all other accessories for installation of EI	RH	7	250	1750	36001 - 36004,38604, 38901 - 38907,40001, 40001 - 40007,38301, 38351 - 38364,38401 - 38411, 38451 - 38458, 38801 - 38803,39301 - 39310, 39451 - 39463, 39801, 39802,38401- 38411
3	Electronic interlocking at ALH huts incl relays , KLCR, fuses , Furniture, indoor cables, throughs, relay racks, CT Rack, fuse changeover, earthing , lighting protection and all other accessories for installation of EI	ALH	3	150	450	36001 - 36003,38604, 38901 - 38907,40001, 40001 - 40007,38301, 38351 - 38364,38401 - 38411, 38451 - 38458, 38801 - 38803,39301 - 39310, 39451 - 39463, 39801, 39802, 38401- 38411
4	IPS at stations including indoor power cables , EI, Relay huts and ALH	NO	11	20	220	38601,38604,
5	Datalogger and other HMU with all accessories	NO	11	12	132	38503
6	outdoor cable 12 core	KM	380	2.7	1026	37204

7	outdoor cable 6 Quad	KM	70	3.3	231	38651
8	OFC cable along with HDPE duct (for signalling and telecom)	KM	80	1.5	120	38657+ 40101
9	Point Machine	Nos	90	1.76	158.4	38811
10	Main Signal with base unit & ladder, route and dependant shunt	Nos	108	0.75	81	38752, 38753, 38758
11	Shunt signal with base and unit	Nos	18	0.13	2.34	38756
12	DP/MDP/SDP/HASSDAC	DP	220	9	1980	36102 divided by 5 (as 36102 is for 5 DP)
13	Location Box (apparatus cases) including Hylum sheet and Terminals	Nos	200	0.5	100	38821 plus 38824- 400 nos
14	LED of Main Signal	Nos	355	0.1	35.5	38759
15	LED Shunt Signal & route	Nos	214	0.08	17.12	38760
16	Telecom material (STM-IV, MUX, Control phone)	CABIN	11	50	550	Specific to DFCC ,NS item
	Cost of Supplies in INR Lakhs				**7253.36**	
Execution and Civil Works						
1	Civil works for ALH /RH	Per ALH/RH	7	8	56	
2	Civil works for Station bldg & A,B & Port Cabins				0	
3	Trenching, cable laying , OFC blowing including Cable route marker, GI pipes , track crossing DWC pipe related activity (one for signalling and one for Telecom)	KM	80	3	240	38701+ 39651+ 39655
4	Indoor Installation of EI , IPS ,VDU and other related activities for Stations	NO	8	15	120	39001 - 39003, 39451 - 39463,39501,39502, 39951,39952
5	Indoor Installation of EI , IPS ,VDU and other related activities for ALH	NO	3	12	36	39001 - 39003, 39451 - 39463,39501,39502, 39951,39952
6	Outdoor installation like point machines, MSDAC, Signals, earthing, Loc. boxes, etc	NO	8	50	400	39101 - 39103, 39601 - 39603, 39951,39952
7	Outdoor installation like MSDAC, Signals, earthing etc as per ALH	NO	3	30	90	39101 - 39103
8	Other misc items like painting, security of materials, stores, etc. Incl station and ALH per unit	NO	11	20	220	39901-39909
9	Contingencies (5% of supplies)	LS	5%		362.67	
	Total Execution cost in Lakhs				**1524.7**	
Total Value of S&T works in Lakhs					8778.0	

	Total Value of S&T work for Alteration in Palghar station				**879.9**	
	Grand Total for S&T				**9657.9**	
Total Value of S&T works in Crores					**96.6**	

14.3 Annexure-3-Detailed Estimate of OHE Works

Over Head Electrification (OHE)			
Description	**Amount (Rs.)**		Total Amount (Rs.)
	PH-1		
	From Take-off to Vadhvan Port Gate	**Inside Port Gate (Track and OHE)**	
OHE Works	68,28,50,237	44,23,67,911	1,12,52,18,148
OHE-PSI	9,99,66,339		9,99,66,339
Total	**78,28,16,576**	**44,23,67,911**	**1,22,51,84,487**

OHE Work-Schedule-1					
Sr. no.	**Item Description**	**Unit**	**Rate Including 18 % GST**	**Total Quantity**	**Total Amount**
1	Preparation of design and drawing for overhead equipment and verification of purchaser Modification plan	TKM	15152.46	103.00	1560703
2	Excavation for Structure- Excavation in all types of soils and soft/hard rock, concrete/masonry drains/walls	CUM	191.24	13000.0	2486120
3	Foundation work				0
	providing and laying of concrete for foundation and plinth in all types of soils using M-15 grade concrete for main foundation and M-20 grade concrete for grouting and muffing including nominal reinforcement wherever required as per RDSO drawings including muffing:				0
a	M-15 (Foundation)	CUM	6901.82	12000	82821840
b	M-20 (Grouting)	CUM	9185.71	2000.0	18371420
4	Providing and fixing Centring and Shuttering including oil for casting concrete including frame work wherever necessary.	Sq. M	955.24	2000	1910480

5	Supply of rolled or fabricated and galvanized Traction Mast, TTC, Portals, AT Mast, Dwarf Mast etc.	MT	115982.14	4500	521919630
6	Erection of rolled or fabricated and galvanized Traction Mast, TTC, Portals, AT Mast, Dwarf Mast etc.	MT	8588.91	4500	38650095
7	Supply of Fabricated and galvanized SPS other than Mast	MT	116949.53	200.0	23389906
8	Erection of Fabricated and galvanized SPS other than Mast	MT	8363.45	140.0	1170883
9	Supply of Single Bracket assembly	Nos.	18514.9	3500	64802150
10	Erection of Single Bracket assembly	Nos.	1796	3500	6286000
11	Supply of Stay and Bracket Tube composite Insulator set CD-1600 mm	Set	8189.34	3500	28662690
12	Erection of Stay and Bracket Tube composite Insulator set CD-1600 mm	Set	1184.21	3000	3552630
13	Supply of OHE with complete fitting without contact and catenary wire	TKM	31596.29	110	3475592
14	Erection of OHE with complete fitting without contact and catenary wire	TKM	30557.28	103	3147400
15	Supply of Copper jumper wire	Nos.	6739.05	120	808686
16	Erection of Copper jumper wire	Nos.	673.25	120	80790
17	Supply of Guy Rod Assembly	Nos.	9021.43	150	1353215
18	Erection of Guy Rod Assembly	Nos.	1181.71	150	177257
19	Supply of 09-ton Insulators (CD-1600)	Nos.	6609.45	150	991418
20	Erection of 09-ton Insulators (CD-1600)	Nos.	394.03	150	59105
21	Supply of 3 Pulley ATD with Counterweight Assembly.	Nos.	64662.77	70	4526394
22	Erection of 3 Pulley ATD with Counterweight Assembly.	Nos.	4300.25	70	301018
23	Supply of 5 Pulley ATD with Counterweight Assembly.	Nos.	109161.8	40	4366472
24	Erection of 5 Pulley ATD with Counterweight Assembly.	Nos.	4300.25	40	172010
25	Supply of Retro reflective type Number plate as per DFCCIL requirement including all fixing arrangement	Nos.	713.9	3000	2141700

26	Erection of Retro reflective type Number plate as per DFCCIL requirement including all fixing arrangement	Nos.	71.39	3000	214170
27	Supply of danger/Caution Board, unwired turn out board, Engine Stop Board, Sigma Board, Neutral section Board and other Boards per DFCCIL requirement	Nos.	1293.79	100	129379
28	Erection of danger/Caution Board, unwired turn out board, Engine Stop Board, Sigma Board, Neutral section Board and other Boards per DFCCIL requirement	Nos.	144.34	100	14434
29	Supply of Single earth electrode with earth Pit complete	Nos.	2902.35	50	145118
30	Erection of Single earth electrode with earth Pit complete	Nos.	1253.8	50	62690
31	Supply of Light Weight Section Insulator Assembly as DFCCIL requirement	Nos.	350772.91	75	26307968
32	Erection of Light Weight Section Insulator Assembly as DFCCIL requirement	Nos.	4001.49	75	300112
33	Supply of structure Bond including Rail clamp	Nos.	745.29	4000	2981160
34	Erection of structure Bond including Rail clamp	Nos.	181.76	4000	727040
35	Supply of Catenary wire of 65/125 sq. mm as per DFCCIL requirement.	MT	990243.02	115.00	113877947
36	Supply of Contact Wire of 107 /150 sq. mm as per DFCCIL requirement	MT	990243.02	115.00	113877947
37	Supply of 150 sq. mm Contact wire Splice	Nos.	4000.2	20	80004
38	Erection of 150 sq. mm Contact wire Splice	Nos.	400.02	20	8000
39	Supply of 107 sq. mm Contact wire Splice	Nos.	2655	20	53100
40	Erection of 107 sq. mm Contact wire Splice	Nos.	265.5	20	5310
41	Supply of 125 sq. mm Catenary wire Splice	Nos.	1876.2	20	37524
42	Erection of 125 sq. mm Catenary wire Splice	Nos.	187.62	20	3752
43	Supply of 65 sq. mm Catenary wire Splice	Nos.	885	20	17700
44	Erection of 65 sq. mm Catenary wire Splice	Nos.	88.5	20	1770

45	Supply of PTFE Short Neutral section Assembly	Nos.	1156387.36	6	6938324
46	Erection of PTFE Short Neutral section Assembly	Nos.	8342.18	2	16684
47	Dismantling of Bracket Assembly	Nos.	1494.66	10	14947
48	Cutting and Removal of Existing structure	Nos.	1060.29	6	6362
49	Reclamation of OHE Mast/structures	Nos.	3414.09	10	34141
50	Dismantling of Guy rod assembly	Nos.	733.18	6	4399
51	Dismantling of Fabricated steel other than Mast	MT	13442.81	10	134428
52	Dismantling of OHE /Feeder wire	TKM	18611.79	1.0	18612
53	Dismantling of Copper Jumper	Nos.	682.23	6	4093
54	Dismantling of ATD assembly and Termination	Nos.	3881.42	2	7763
55	Dismantling of Light Weight section Insulator Assembly	Nos.	3202.61	2	6405
56	Dismantling of 09 Ton Insulators	Nos.	766.53	6	4599
57	Supply of 288 Sq. mm AAAC Feeder wire with all fittings as required.	TKM	540663	60	32439780
58	Erection of 288 Sq. mm AAAC Feeder wire with all fittings as required	TKM	27033.15	53	1432757
59	Supply of 288 Sq. mm feeder wire Splice	Nos.	2393.04	20	47861
60	Erection of 288 sq. mm. feeder wire Splice.	Nos.	239.3	20	4786
61	Handling Loading unloading and /transportation of DFC supply /released OHE material such as Mast, Wires, Fittings SPS etc. From IMD/ISMD to Site & released material from site to IMD/ISMD	MT	3872.58	50	193629
62	Supply of feeder Suspension Clamp Make Arruti.	Each	2596	1310	3400760
63	Supply of Feeder termination Clamp Make Arruti.	Each	2950	50	147500
64	Supply of Contact Wire 150 sq. mm/125 Sq. mm Catenary wire End Clamp for Make Arruti.	Each	11516	60	690960
			Total Schedule -1		**1,12,19,31,744.114**

Schedule-02-OHE Work					
Sr. no.	**Item Description**	**Unit**	**Rate Including 18 % GST**	**Total Qty.**	**Total Amount**
1	Erection of rolled or Fabricated and galvanized Traction Mast, TTC, Portals, AT Mast, Dwarf Mast etc.	MT	8588.91	300	2576673
2	Erection of Fabricated and galvanized SPS other than Mast	MT	8363.45	50.0	418173
3	Erection of Single Bracket assembly	Nos.	1796	50	89800
4	Erection of Stay and Bracket Tube composite Insulator set CD-1600 mm	Set	1184.21	50	59211
5	Erection of Copper jumper wire	Nos.	673.25	20	13465
6	Erection of Guy Rod Assembly	Nos.	1181.71	20	23634
7	Erection of 09 ton Insulators (CD- 1600)	Nos.	394.03	40	15761
8	Erection of 3 Pulley ATD with Counterweight Assembly.	Nos.	4300.25	15	64504
9	Erection of 5 Pulley ATD with Counterweight Assembly.	Nos.	4300.25	5	21501
10	Erection of Light Weight Section Insulator Assembly as DFCCIL requirement	Nos.	4001.49	10	40015
11	Erection of 288 sq. mm feeder wire Splice	Nos.	239.3	6	1436
12	Erection of PTFE Short Neutral section Assembly	Nos.	8342.18	4	33369
13	Erection of 288 Sq. mm AAAC Feeder wire with all fittings as required	TKM	27033.15	2	54066
14	Erection of OHE with complete fitting (Conventional type) without contact and catenary wire	TKM	30557.28	2	61115
15	Dismantling of Guy rod assembly	Nos.	733.18	6	4399
16	Dismantling of Fabricated steel other than Mast	MT	13442.81	10	134428
17	Dismantling of OHE /Feeder wire	TKM	18611.79	1.0	18612
18	Dismantling of Copper Jumper	Nos.	682.23	10	6822
19	Dismantling of ATD assembly and Termination	Nos.	3881.42	6	23289
20	Dismantling of Light Weight section Insulator Assembly	Nos.	3202.61	4	12810
21	Dismantling of 09 Ton Insulators	Nos.	766.53	10	7665

22	Dismantling of Bracket Assembly	Nos.	1494.66	26	38861
23	Cutting and Removal of Existing structure	Nos.	1060.29	10	10603
24	Reclamation of OHE Mast/structures	Nos.	3414.09	0	0
		Total Schedule-02			37,30,211.27
		Total Schedule 01 & 02			1,12,52,18,148.23

OHE -PSI Work							
SN	**Description of items**	**Unit**	**Qty**	**Rate**	**Rate after escalation for3 years**	**Amount (Rs.)**	**Amount after escalation**
1	Concrete for foundation						
	a) In Hard Soil.	cum	50	6556	7539	327800	376970
	b) In Rocky soil	cum	50	6358	7312	317900	365585
	c) In other than Hard & Rocky soil.	cum	300	6256	7194	1876800	2158320
2	a) Reinforced concrete for cable trench	cum	100	5810	6682	581000	668150
	b) Reinforced concrete for trench cover.	Sq.m	50	2674	3075	133700	153755
3	Supply, spreading and levelling of 20mm downgraded ballast, padding 150mm in the switch yard.	Cu.m	500	1697	1952	848500	975775
4	Supply, spreading and levelling of Muram	Cu.m	500	101.38	117	50690	58294
	Total of Schedule- 'A'					0	
	Schedule-'B' (Steel & Misc. Items)					0	
1	Supply, of steel gantries/portals/Mast, towers and supporting structures and small parts steel work	MT	100	110000	126500	11000000	12650000
2	Erection of steel gantries/portals/Mast and supporting structures and small parts steel work both for SSP	MT	100	11000	12650	1100000	1265000
3	Supply of galvanized steel structure of difference sizes. (Super structure, stub & 3m/6m/9m extension) and fasteners	MT	5	105000	120750	525000	603750

4	Erection of steel gantries/portals/Mast and supporting structures and small parts steel work both for TSS & Capacitor equipments.	MT	5	11725	13484	58625	67419
5	Supply of Guy. Rod assembly including Mast anchor guy rod fitting.	No.	8	10486	12059	83888	96471
6	Erection of Guy. Rod assembly.	No.	8	1829	2103	14632	16827
7	Supply of Earth electrode (4meter for TSS).	No.	10	2548	2930	25480	29302
8	Erection of Earth electrode(4mm for TSS).	No.	10	1601	1841	16010	18412
9	Supply of Earth electrode(3meter for SSP/SP).	No.	30	1911	2198	57330	65930
10	Erection of Earth electrode(3mm for SSP/SP).	No.	30	1200	1380	36000	41400
11	Supply of Earth leads 75mmx8mm mild steel.	Mtrs.	150	344	396	51600	59340
12	Supply of Earth leads 50mmx6mm mild steel.	Mtrs.	1000	167	192	167000	192050
13	Supply of 50mm x 6mm mild steel structure bond.	No.	200	462	531	92400	106260
14	Erection of Earth leads of sizes 75mmx8mm,50mmx6mm mild steel witn bonds.	Mtrs.	1350	83	95	112050	128858
15	Supply of 8 SWG G.I. Wire for earthing.	Mtrs.	100	29	33	2900	3335
16	Erection of 8 SWG G.I Wire for earthing.	Mtrs.	100	27	31	2700	3105
17	Supply of earth screen wires(with connector).	Mtrs.	300	482	554	144600	166290
18	Erection of Earth screen wires.	Mtrs.	300	56	64	16800	19320
19	Supply of fencing panels as per RDSO approved drg.	Mtrs.	100	3033	3488	303300	348795
20	Erection of fencing panels at sub-stations.	Mtrs.	100	114	131	11400	13110

21	Supply of fencing uprights as per RDSO approved drg.	No.	100	2603	2993	260300	299345
22	Erection of fencing uprights.	No.	100	577	664	57700	66355
23	Supply of gates as per RDSO approved drg.	Mtrs.	2	3205	3686	6410	7372
24	Erection of gates.	No	2	276	317	552	635
25	Supply of anti-climing device for TSS as per RDSO approved drg.	Mtrs.	300	492	566	147600	169740
26	Erection of anti-climbing device at sub-stations.	Mtrs.	300	14	16	4200	4830
27	Provision of cow catcher at entry gate.	No.	2	26238	30174	52476	60347
28	Erection of cow catcher.	No	2	3034	3489	6068	6978
29	Supply & Installation of sets of Fire Buckets of 9 litre capacity.	No.	12	644	741	7728	8887
30	Supply and installation of fire extinguisher CO2 type 11kg capacity.	No.	6	3221	3704	19326	22225
31	Supply and installation of shock treatment chart.	No.	10	1530	1760	15300	17595
32	Supply and installation of General layout diagram of TSS.	No.	6	1407	1618	8442	9708
33	Supply of SF-6 gas filling device.	No.	2	48822	56145	97644	112291
34	Supply of Gas Cylinder containing 11 Kg SF-6 Gas.	No.	2	171142.8	196814	342285.6	393628
35	Supply of First Aid box..	No.	3	806	927	2418	2781
36	Supply of copper strips(25x3 mm) for equipment earthing.	Mtrs.	30	791	910	23730	27290
37	100% Extra for Erection/Modification under power Block.					0	
38	50% Extra for Erection/Modification under power Block during night time.					0	
	Total of Schedule- 'B'					0	
	Schedule- 'C' Electrical Switch Gear					0	

1	Supply of 8MVA 2x25kV, 50HZ Autotransformers(with bushing CT and insulator)	No.	5	6990687	8039290	34953435	40196450
2	Erection, testing and commissioning of Auto transformer of 8MVA, 54kV/27kV, 50Hz with Bushing CT, Oil, Oil filteration and complete in all respect as per RDSO Specification suitable for 2x25 KV AT feeding system	No.	5	85523	98351	427615	491757
3	Supply of 2*25kV, double pole Vacuum Circuit Breaker as per RDSO Specification No. TI/SPC/PSI/LVCBIN/ 0120	No.	7	1050000	1207500	7350000	8452500
4	Erection & commissioning of 2*25kV, double pole Vacuum Circuit Breaker as per RDSO Specification No. TI/SPC/PSI/LVCBIN/ 0120	No	7	65000	74750	455000	523250
5	Supply of 2* 25kV, double pole Vacuum Interrupter as per RDSO Specification No. TI/SPC/PSI/LVCBIN/ 0120	No.	10	925000	1063750	9250000	10637500
6	Erection & commissioning of 2* 25kV, double pole Vacuum Interrupter as per RDSO Specification No. TI/SPC/PSI/LVCBIN/ 0120	No	10	60000	69000	600000	690000
7	Supply of 2x25kV double pole Isolator with interlocking mechanism 1600A.	No.	24	109967	126462	2639208	3035089
8	Erection of 2x25 KV DP Isolator with interlocking arrangement (3150A & 2000A).	No.	24	4248	4885	101952	117245
9	Supply of 25kV single pole Isolator with interlocking mechanism 1600A.	No.	6	46080	52992	276480	317952

10	Erection of 25 KV Single Pole Isolator with interlocking arrangement (3150A & 2000A).	No.	6	2740	3151	16440	18906
11	Supply of 25kV single pole BM with interlocking mechanism 1600A.	No	4	335737	386098	1342948	1544390
12	Erection of 25 KV Single Pole BM.	No	4	12538	14419	50152	57675
13	Supply of 2x25kV Potential transformer (Type-III) 27.5KV/110V.	No.	8	63506	73032	508048	584255
14	Erection of 2x25kV Potential transformer (Type-III) 27.5KV/110V	No.	8	1204	1385	9632	11077
15	Supply of 2x25KV Current transformer (3000/1500/5A).	No.	12	97078	111640	1164936	1339676
16	Erection of 25Kv Current transformer (3000/1500/5A).	No.	12	1354	1557	16248	18685
17	Supply of Control and relay panel for 2*25kv system	No.	2	5550000	6382500	11100000	12765000
18	Erection, testing & Commissioning of Control and relay panel for 2*25kv	No	2	200000	230000	400000	460000
19	Supply of Lightning Arrestors 42 KV rating for 25 KV side.	No.	20	32871	37802	657420	756033
20	42 KV Surge Arrester disconnector assembly for track side 25 KV Surge Arrestor of class 3 type.	No.	20	3246	3733	64920	74658
21	Erection of Lightning Arrestors 42 KV rating in 25 KV side.	No.	20	908	1044	18160	20884
22	Supply, of 25kV/240V Auxiliary supply transformer (100kVA capacity).	No.	2	213046	245003	426092	490006
23	Supply of 25kV Drop out fuse switches for 100kVA Auxiliary Supply transformers.	No.	0	14683	16885	0	
24	Erection, testing and commissioning of 25kV/240V Auxiliary supply transformer with dropout fuse(100kVA capacity).	No.	0	12400	14260	0	
25	Supply, of 25kV/240V Auxiliary supply transformer (25kVA capacity).	No.	2	190388	218946	380776	437892

26	Supply of 25kV Drop out fuse switches for 25kVA Auxiliary Supply transformers.	No.	2	2480	2852	4960	5704
27	Erection, testing and commissioning of 25kV/240V Auxiliary supply transformer with dropout fuse(25kVA capacity).	No.	2	12400	14260	24800	28520
28	Supply of 110V, 200 AH, Lead Acid Batteries.	Set	2	269456	309874	538912	619749
29	Erection of 110V, 200 AH, Lead Acid Batteries.	Set	2	15599	17939	31198	35878
30	Supply of 110V, 40 AH, Lead Acid Batteries.	Set	0	138613	159405	0	
31	Supply of Battery Chargers for 110V,40AH, Lead Acid Batteries.	No.	0	98025	112729	0	
32	Erection of Battery Chargers for 110V, 40 AH Lead Acid Batteries.	No.	0	6003	6903	0	
33	Supply of Battery Chargers for 110V,200AH, Lead Acid Batteries.	No.	2	125068	143828	250136	287656
34	Erection of Battery Chargers for 110V, 200 AH Lead Acid Batteries.	No.	2	1838	2114	3676	4227
35	Supply of 240V L.T. Distribution Boards in the control room for 100kVA L.T supply transformer.	No.	2	53729	61788	107458	123577
36	Erection of 240V L.T. Distribution Boards in the control room for 100kVA L.T supply transformer.	No.	2	4000	4600	8000	9200
37	Supply of 240V L.T. Distribution Boards in the control room for 25kVA L.T supply transformer.	No.	2	22050	25358	44100	50715
38	Erection of 240V L.T. Distribution Boards in the control room for 25kVA L.T supply transformer.	No.	2	1586	1824	3172	3648

39	Supply of 110V DC distribution boards. comprising of 63A DP change over switch for incoming & 15X32A DP MCBs for outgoing & voltmeter, indication etc.	No.	2	25700	29555	51400	59110
40	Erection of 110V DC distribution boards. comprising of 63A DP change over switch for incoming & 15X32A DP MCBs for outgoing & voltmeter, indication etc.	No.	2	1158	1332	2316	2663
41	Supply of PVC insulated copper cable of size 7x2.5 sq mm for circuit breakers & Interrupter control and indication circuits.	Mtrs.	800	212	244	169600	195040
42	Erection/Laying of PVC insulated copper cable of size 7x2.5 sq mm for circuit breakers & Interrupter control and indication circuits.	Mtrs.	800	15	17	12000	13800
43	Supply of PVC insulated copper cable of size 10x2.5 sq mm for transformer alarm/trip circuits & tap changer control.	Mtrs.	0	298	343	0	
44	Erection/Laying of PVC insulated copper cable of size 10x2.5 sq mm for transformer alarm/trip circuits & tap changer control.	Mtrs.	0	14	16	0	
45	Supply of PVC insulated copper cable of size 4x4 sq mm for Transformer bushing CT circuits & 110V DC circuits.	Mtrs.	0	205	236	0	
46	Erection/Laying of PVC insulated copper cable of size 4x4 sq mm for Transformer bushing CT circuits & 110V DC circuits.	Mtrs.	0	14	16	0	
47	Supply of PVC insulated copper cable of size 2x4 sq mm for Current transformer circuits 110V DC & 240V AC supply circuits.	Mtrs.	600	118	136	70800	81420

48	Erection/Laying of PVC insulated copper cable of size 2x4 sq mm for Current transformer circuits 110V DC & 240V AC supply circuits.	Mtrs.	600	14	16	8400	9660
49	Supply of PVC insulated copper cable of size 2x2.5 sq mm for Potential transformer and 240V AC Supply Circuits.	Mtrs.	600	82	94	49200	56580
50	Erection/Laying of PVC insulated copper cable of size 2x2.5 sq mm for Potential transformer and 240V AC Supply Circuits.	Mtrs.	600	14	16	8400	9660
51	Supply of PVC insulated aluminium cable size 2x300 sq mm for L.T. Power supply for Oil filtration plant	Mtrs.	0	1427	1641	0	
52	Erection/laying of PVC insulated aluminium cable size 2x300 sq mm for L.T. Power supply for Oil filtration plant	Mtrs.	0	95	109	0	
53	Supply ,of Current Transformer 220KV (400/200/100/1A) 0.2S class	Nos	0	483800	556370	0	
54	Erection, testing and commissioning of Current Transformer 220KV (400/200/100/1A) 0.2S class	No.	0	20261	23300	0	
55	Supply of Potential Transformer (220 KV, 0.2 Class)	No.	0	477900	549585	0	
56	Erection, testing and commissioning of Potential Transformer (220 KV, 0.2 Class)	No.	0	14680	16882	0	
57	Supply of circular RCC pipe 2 meters long & 150 mm inside dia.	Mtrs	30	104	120	3120	3588
58	Supply of class 'B' G.I. pipe 3.00 inch dia.	Mtrs	20	486	559	9720	11178

59	Supply of 3 source Auto changeover panel of capacity 150 Amps for 25 KV AT as per RDSO's specification No. TI/SPC/PSI/CLS/0020 and RDSO specification no. TI/SPC/PSI/CLS/0023 (Including A&C slip 1,2,3&4) with latest amendments	No.	2	143086.7	164550	286173.4	329099
60	Cable junction Box for 2x185 sqmm cable with Al Bus bar for single phase with neutral suitable for termination of 150 Amps CLS panel for 25 KVA AT	No	2	7353	8456	14706	16912
61	Laying of Cable along the Track/ Road through Semi circular RCC pipe	Mts	20	17.22	20	344.4	396
62	Laying of Cable across the Track/ Road through GI/ circular RCC pipe	Mts	20	23.82	27	476.4	548
63	Laying of Cable in Open Air through 3.00 inch GI pipe with all materials required	Mts	25	39.7	46	992.5	1141
64	Supply of 25KVA AT mast Distribution Box Size 300x400x200 mm made of 2mm thick CRC steel sheet with CAM and pad locking arrangement and Stud type terminals suitable for 2x185 sqm. AL Cable. 340 Amps	No.	2	18283	21025	36566	42051
65	Erection of Distribution Box 300x400x200 mm for 10 KVA and 25 KVA AT	Nos.	2	239.22	275	478.44	550
66	Erection and commissioning of AUTO Change over CLS Panel 63 Amps and 150 Amps.	Nos.	2	422.53	486	845.06	972
67	Erection of Junction Box for 10 KVA AT and 25 KVA AT	Nos.	2	239.67	276	479.34	551
68	100% Extra for Erection/Modification under power Block.					0	

69	50% Extra for Erection/Modification under power Block during night time.					0	
	Total of Schedule- 'C'					0	
	Schedule- 'D' Insulator					0	
1	Supply of 25kV Support/post Insulator with components	No.	300	5328	6127	1598400	1838160
2	Erection of 25kV Support/post Insulator with components	Each	300	261	300	78300	90045
3	Supply of 25kV suspension 9 ton insulator with suspension arrangement.	No.	20	6091	7005	121820	140093
4	Erection of 25kV suspension 9 ton insulator with suspension arrangement.	Each	20	1306	1502	26120	30038
5	100% Extra for Erection/Modification under power Block.					0	
6	50% Extra for Erection/Modification under power Block during night time.					0	
	Total of Schedule- 'D'					0	
	Schedule- 'E' - Aluminium Item					0	
1	Supply of tubular Aluminium busbars(Bus bar arrangement					0	
a)	88.2/76.2 mm dia.	Mtrs.	200	776	892	155200	178480
b)	50/39mm dia	Mtrs.	200	506	582	101200	116380
2	Supply of Rigid bimetallic terminal connector suitable for 88.2/76.2 mm dia. Aluminium tubular busbar to terminal pad of 25kV Isolator /CT as per design.	No.	26	3258	3747	84708	97414
3	Supply of expansion type terminal connector to suit 88.2/76.2 mm dia. Aluminium tubular busbar, terminal pad of 25kV CT/Isolator as per design.	No.	30	5051	5809	151530	174260

4	Supply of 25kV system rigid Bus splice connector to suit 88.2/76.2 mm dia. Aluminium tube on both ways as per design.	No.	6	3164	3639	18984	21832
5	Supply of 25kV system TEE connector to suit 88.2/76.2 mm dia. Aluminium tubular Busbar. as per design.	No.	6	3359	3863	20154	23177
6	Supply of Rigid through connector to suit 88.2/76.2 mm dia. Aluminium tubular Busbar & SPIDER AAC conductor for 25kV P.T. Type-II	No.	6	2987	3435	17922	20610
7	Supply of 25kV system expansion Bus coupler to suit 88.2/76.2 mm dia. Al. tube as per design.	No.	6	7170	8246	43020	49473
8	Supply of 25kV system Tee connector to suit 88.2/76.2 mm dia. aluminium tubular Spider AAC conductor as per design.	No.	4	3009	3460	12036	13841
9	Supply of 25kV system Tee to suit ZEBRA (28.58 dia) ACSR conductor on both ways (ID-11040).	No.	6	3002	3452	18012	20714
10	Supply of Rigid bimetallic splice for 50 mm dia bus bar (RI -11180)	No.	6	4323	4971	25938	29829
11	Supply of Rigid terminal on SI to suit 50 mm O/D Al. Bus bar O/D Al. Bus Bar (ID- 11200).	No.	6	1260	1449	7560	8694
12	Supply of Sliding clamp for 50mm O/D Al. busbar (ID-11190).	No.	6	1880	2162	11280	12972
13	Supply of Rigid connector on SI to suit ZEBRA (28.58 dia) ACSR conductor (ID-11050).	No.	4	1341	1542	5364	6169
14	Supply of 25kV system TEE connector to suit 36 O/D Al. Busbar to 50mm O/D Al. Busbar (ID-11240)	No.	4	3199	3679	12796	14715

15	Supply of Al. busbar connectors Bus terminal (6480).	No.	20	2332	2682	46640	53636
16	Supply of Al. busbar connectors Bus splice (6490).	No.	20	2378	2735	47560	54694
17	Supply of Al.busbar connectors Bus TEE connector (6500).	No.	30	2426	2790	72780	83697
18	Supply of Al. busbar connectors terminal connector (36/20) (6530).	No.	20	2237	2573	44740	51451
19	Supply of Al. busbar connectors: - Tap connector (6520).	No.	20	2237	2573	44740	51451
20	Supply of Al. busbar connectors Flexible bus splice (6550).	No.	20	5472	6293	109440	125856
21	Supply of Al. busbar connectors terminal connector Bolted Type (6830-I).	No.	10	1829	2103	18290	21034
23	Supply of Al. busbar 36 mm / 28 mm.	Mtrs.	10	387	445	3870	4451
24	Supply of Aluminium jumper.(with connectors)	No.	30	2428	2792	72840	83766
25	Supply & erection of Panther ACSR Conductor for 220kV line	Km	0.1	187040	215096	18704	21510
26	Supply & erection of Zebra ACSR Conductor.	Mtrs.	10	461	530	4610	5302
27	Supply of Aluminium Feeder/Return Conductor (Single Spider) With SPS	KM	1	296000	340400	296000	340400
28	Erection of 25 KV Alu. Feeder/Return Conductor (Single Spider) With SPS	KM	1	39843	45819	39843	45819
29	Supply of Component of termination of 25 KV Alu. Feeder/Return conductor.				0	0	
	i) Supply of 9T insulator	No.	40	5183	5960	207320	238418
	ii) Components	No.	40	4603	5293	184120	211738
30	Erection of termination of 25 KV Alu. Feeder/Return conductor.	No.	20	806	927	16120	18538
31	Supply of Hard drawn Cu-conductor for cross feeder 150 sq.mm (37/2.25 mm)	Mtrs.	300	742	853	222600	255990

32	Erection of Hard drawn Cu-conductor for cross feeder 150 sq.mm (37/2.25 mm)	Mtrs.	300	31	36	9300	10695
	Supply of Component of termination of Large copper jumper wire 150 sqm.				0	0	
	i) Supply of 9T insulator	No.	20	5183	5960	103660	119209
	ii) Components	No.	20	3702	4257	74040	85146
33	Erection of components of termination of large Cu jumper wire 150 sq mm	No.	20	793	912	15860	18239
34	Supply of Large copper jumper wire 160 sqmm.	Mtrs.	100	3689	4242	368900	424235
35	Erection of Large copper jumper wire 160 sqmm.	Mtrs.	100	91	105	9100	10465
36	Supply of Componant of Large copper jumper wire 160 sqmm.	No.	30	3689	4242	110670	127271
37	Erection of components of 160 sq mm Cu-Cross Feeder.	No.	30	91	105	2730	3140
	100% Extra for Erection/Modification under power Block.					0	
	50% Extra for Erection/Modification under power Block during night time.					0	
	Total of Schedule- 'E'					0	
	SCHEDULE- 'F' Erection & Dismantling Work					0	
1	Preparation of Design and drawings for traction sub-stations & FP.	Each	0	111872	128653	0	
2	Preparation of Design and drawings for SP/SSP.	Each	6	19186	22064	115116	132383
3	Erection and commissioning of apex meters for check metering system including fully wired metering panel for mounting of Apex Rack.	No.	0	29482	33904	0	

4	Modification, up-gradation, testing and commissioning of existing RTU's for TSS to incorporate the 3rd bay arrangements at the TSS, (inclusive of software modification at RCC.)	No.	0	195700	225055	0	
5	Modification, Up gradation, Testing and Commissioning of existing RTU's for SP/SSP (inclusive of software modification at RCC.)	No.	3	178190	204919	534570	614756
6	Dismantling and removal of :				0	0	
	Autotransformer with its accessories (dismantaling and dragging)	No.	0	130500	150075	0	
(i)	25 KV CB/BM with complete components	No.	0	3397	3907	0	
(iii)	Isolator complete	No.	0	5139	5910	0	
(iv)	Breaking of old foundation like transformer plinth, CB foundation and buffel wall etc.	Cu.M	0	859	988	0	
(v)	Control cable	Mt	0	15	17	0	
(vi)	Battery with charger assembly	No.	0	4098	4713	0	
(vii)	Auxiliary transformer with DO fuse.	No.	0	3558	4092	0	
(viii)	LA	No.	0	254	292	0	
(ix)	PT	No.	0	562	646	0	
(x)	Gantry Mast/Steel Structure/SPS	MT	0	3583	4120	0	
(xi)	Feeder conductor	km	0	19615	22557	0	
7	100% Extra for Erection/Modification under power Block.	LS				0	
8	50% Extra for Erection/Modification under power Block during night time.					0	
	Total of Schedule- 'F'					0	
	Schedule-'G' (Provision of Earthing system)					0	
1	Drilling of holes on rails.	No.	30	58.61	67	1758.3	2022

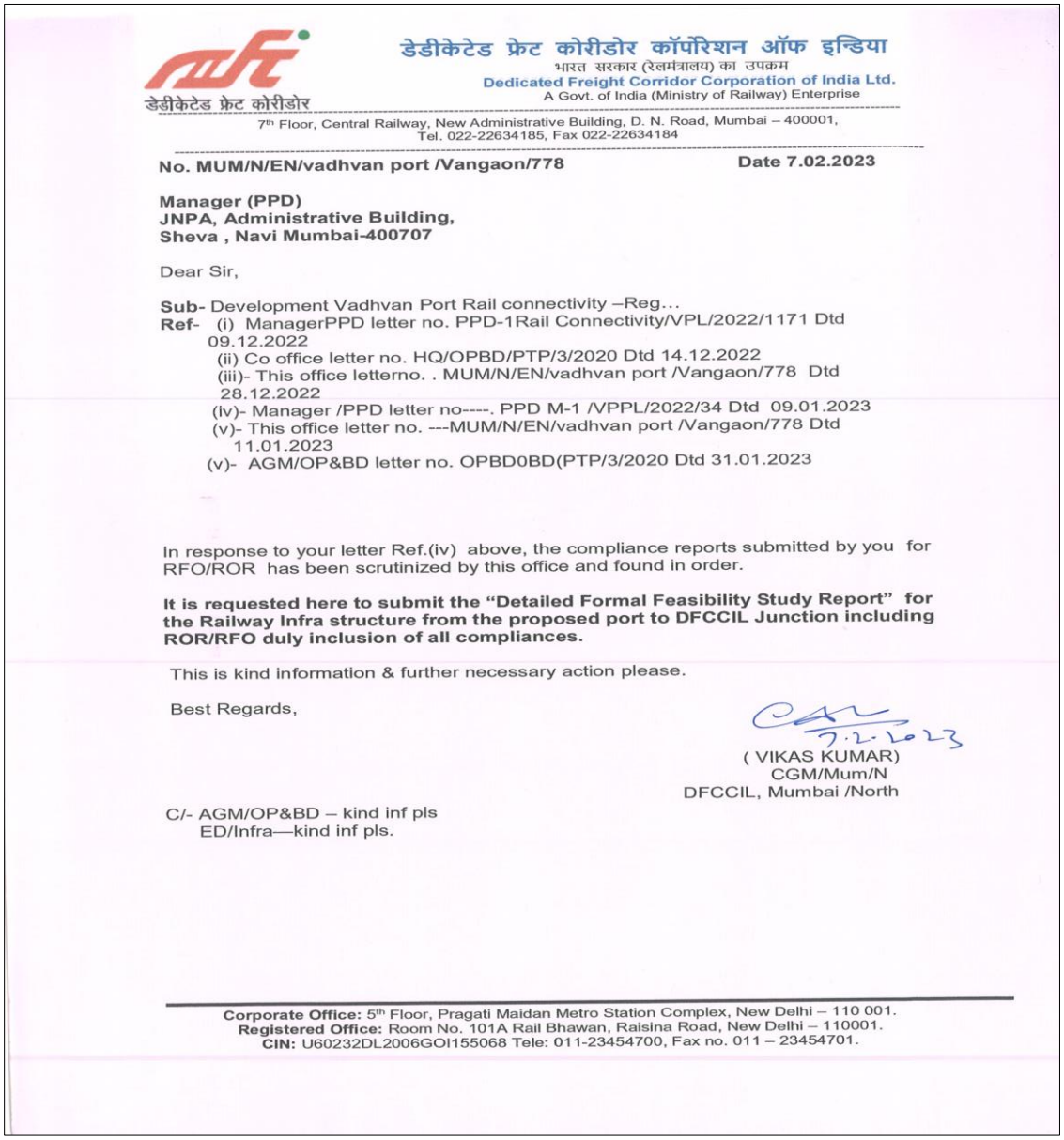
2	Supply and Installation of RDSO approved high productivity fasteners (Rail contact system) for fixing of OHE bonds comprising of following: a) M-12 stainless steel bolt. b) M-12 stainless steel washer. c) M-12 stainless steel self locking nut or galvanized full metal locking nut	Set	20	2854.66	3283	57093.2	65657
3	Excavation and refilling of soil (15X0.6X1.0)	Cum	100	584.16	672	58416	67178
4	Transportation & Erection of 13m long burried rail.	No.	4	2920.82	3359	11683.28	13436
5	Supply and Erection of 20mm dia copper rivets.	No.	20	321.39	370	6427.8	7392
6	Supply and Installation of higher productivity fasteners (Rail contact system with Tin plated Copper bush attachment) for fixing of traction bond as per RDSO specification no. TI/PSI/PROTECT/ Failure/12.	No.	20	3213.85	3696	64277	73919
7	SCADA	LS					1500000
	Total					**98466339**	**9,99,66,338.72**

Electrical (General Supply)						
No.	**Description**	**Unit**	**Quantity**	**Rate**	**Amount (Rs)**	
					Phase 1	
					From Take-off to Vadhvan Port Gate	**Inside Port Gate (Track and OHE)**
1	Electrification of Service Building, Electronic Weigh Bridge, cabins, electrification of office complex by providing tube light fittings desert collers, air conditions, plug points, electrification of tippler tracks by providing bracket lights inclusive of Contingencies and D&G charges	Lumpsum	1		2,50,00,000.00	1,50,00,000.00
	Total Cost of Electrical (General Supply) (In Rs.)				**2,50,00,000.00**	**1,50,00,000.00**

Estimate for Mechanical					
Sr. No.	**Particular**	**QTY**	**Unit**	**Rate**	**Cost (Rs)**
1	Re-railing and other mechanical Equipment			Lumpsum	4,50,00,000
2	EIMWB	4	nos.	35,00,000	1,40,00,000
	Total (Rs)				**5,90,00,000**

14.4 DFCCIL Letter Concerning ROR

Figure 14-1 Figure 15 1, DFCCIL Letter Concerning ROR



डेडीकेटेड फ्रेट कोरीडोर कॉर्पोरेशन ऑफ इन्डिया
भारत सरकार (रेलमंत्रालय) का उपक्रम
Dedicated Freight Corridor Corporation of India Ltd.
A Govt. of India (Ministry of Railway) Enterprise
डेडीकेटेड फ्रेट कोरीडोर
7th Floor, Central Railway, New Administrative Building, D. N. Road, Mumbai – 400001,
Tel. 022-22634185, Fax 022-22634184

No. MUM/N/EN/vadhvan port /Vangaon/778 **Date 7.02.2023**

Manager (PPD)
JNPA, Administrative Building,
Sheva , Navi Mumbai-400707

Dear Sir,

Sub- Development Vadhvan Port Rail connectivity –Reg…
Ref- (i) ManagerPPD letter no. PPD-1Rail Connectivity/VPL/2022/1171 Dtd 09.12.2022
(ii) Co office letter no. HQ/OPBD/PTP/3/2020 Dtd 14.12.2022
(iii)- This office letterno. . MUM/N/EN/vadhvan port /Vangaon/778 Dtd 28.12.2022
(iv)- Manager /PPD letter no----. PPD M-1 /VPPL/2022/34 Dtd 09.01.2023
(v)- This office letter no. ---MUM/N/EN/vadhvan port /Vangaon/778 Dtd 11.01.2023
(v)- AGM/OP&BD letter no. OPBD0BD(PTP/3/2020 Dtd 31.01.2023

In response to your letter Ref.(iv) above, the compliance reports submitted by you for RFO/ROR has been scrutinized by this office and found in order.

It is requested here to submit the "Detailed Formal Feasibility Study Report" for the Railway Infra structure from the proposed port to DFCCIL Junction including ROR/RFO duly inclusion of all compliances.

This is kind information & further necessary action please.

Best Regards,

7.2.2023
(VIKAS KUMAR)
CGM/Mum/N
DFCCIL, Mumbai /North

C/- AGM/OP&BD – kind inf pls
ED/Infra—kind inf pls.

Corporate Office: 5th Floor, Pragati Maidan Metro Station Complex, New Delhi – 110 001.
Registered Office: Room No. 101A Rail Bhawan, Raisina Road, New Delhi – 110001.
CIN: U60232DL2006GOI155068 Tele: 011-23454700, Fax no. 011 – 23454701.

15 Drawings

15.1 Key Plan- D1

Attached herewith

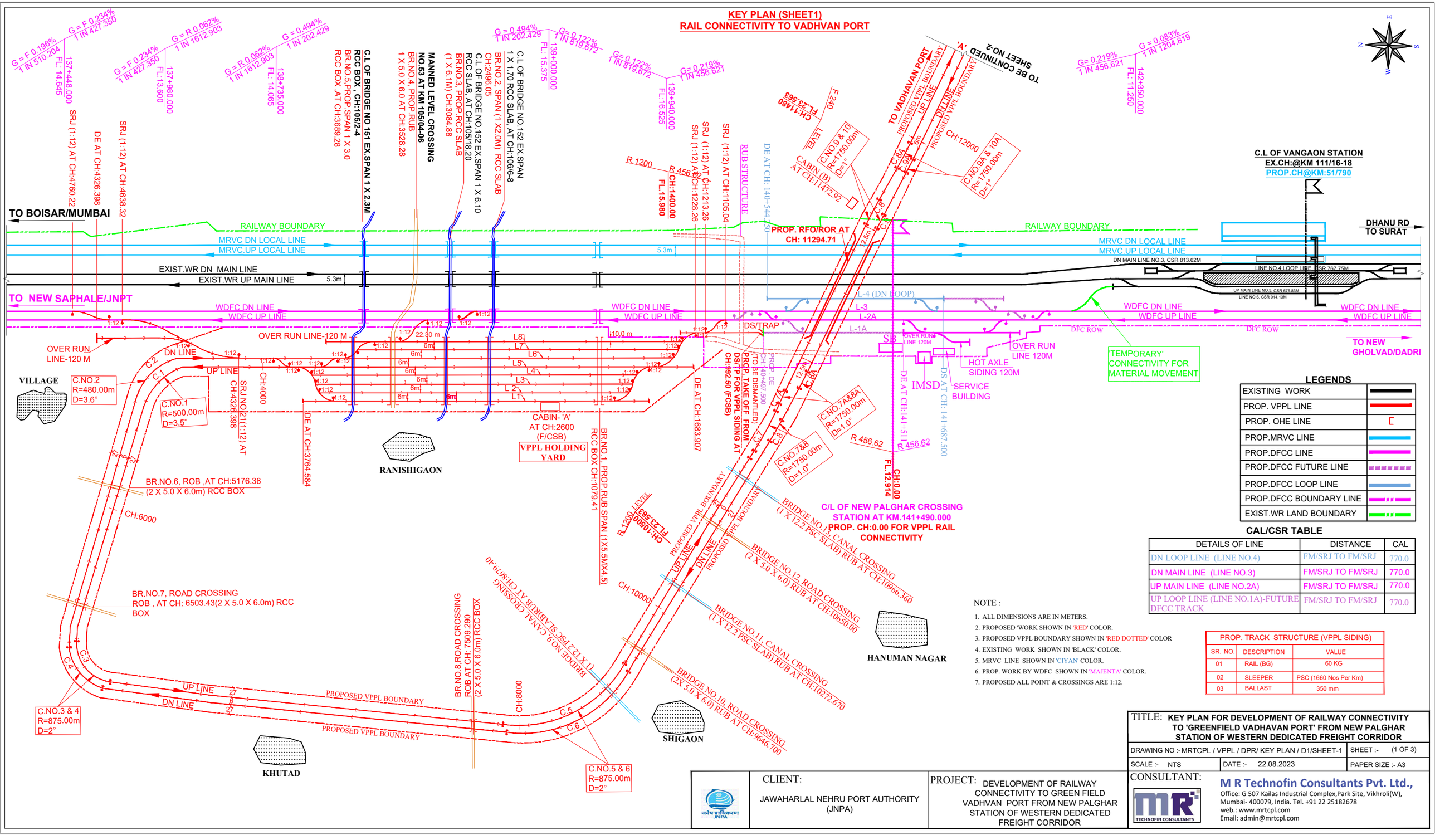
15.2 ESP & L-Section (05 Sheets)- D2

Attached herewith

15.3 Schematic SIP-D3

Attached herewith

KEY PLAN (SHEET1)
RAIL CONNECTIVITY TO VADHVAN PORT



LEGENDS

EXISTING WORK	
PROP. VPPL LINE	
PROP. OHE LINE	
PROP.MRVC LINE	
PROP.DFCC LINE	
PROP.DFCC FUTURE LINE	
PROP.DFCC LOOP LINE	
PROP.DFCC BOUNDARY LINE	
EXIST.WR LAND BOUNDARY	

CAL/CSR TABLE

DETAILS OF LINE	DISTANCE	CAL
DN LOOP LINE (LINE NO.4)	FM/SRJ TO FM/SRJ	770.0
DN MAIN LINE (LINE NO.3)	FM/SRJ TO FM/SRJ	770.0
UP MAIN LINE (LINE NO.2A)	FM/SRJ TO FM/SRJ	770.0
UP LOOP LINE (LINE NO.1A)-FUTURE DFCC TRACK	FM/SRJ TO FM/SRJ	770.0

NOTE :

1. ALL DIMENSIONS ARE IN METERS.
2. PROPOSED 'WORK SHOWN IN 'RED' COLOR.
3. PROPOSED VPPL BOUNDARY SHOWN IN 'RED DOTTED' COLOR
4. EXISTING WORK SHOWN IN 'BLACK' COLOR.
5. MRVC LINE SHOWN IN 'CIYAN' COLOR.
6. PROP. WORK BY WDFC SHOWN IN 'MAJENTA' COLOR.
7. PROPOSED ALL POINT & CROSSINGS ARE 1:12.

PROP. TRACK STRUCTURE (VPPL SIDING)		
SR. NO.	DESCRIPTION	VALUE
01	RAIL (BG)	60 KG
02	SLEEPER	PSC (1660 Nos Per Km)
03	BALLAST	350 mm

TITLE: **KEY PLAN FOR DEVELOPMENT OF RAILWAY CONNECTIVITY TO 'GREENFIELD VADHAVAN PORT' FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR**

DRAWING NO :- MRTCPL / VPPL / DPR/ KEY PLAN / D1/SHEET-1 | SHEET :- (1 OF 3)

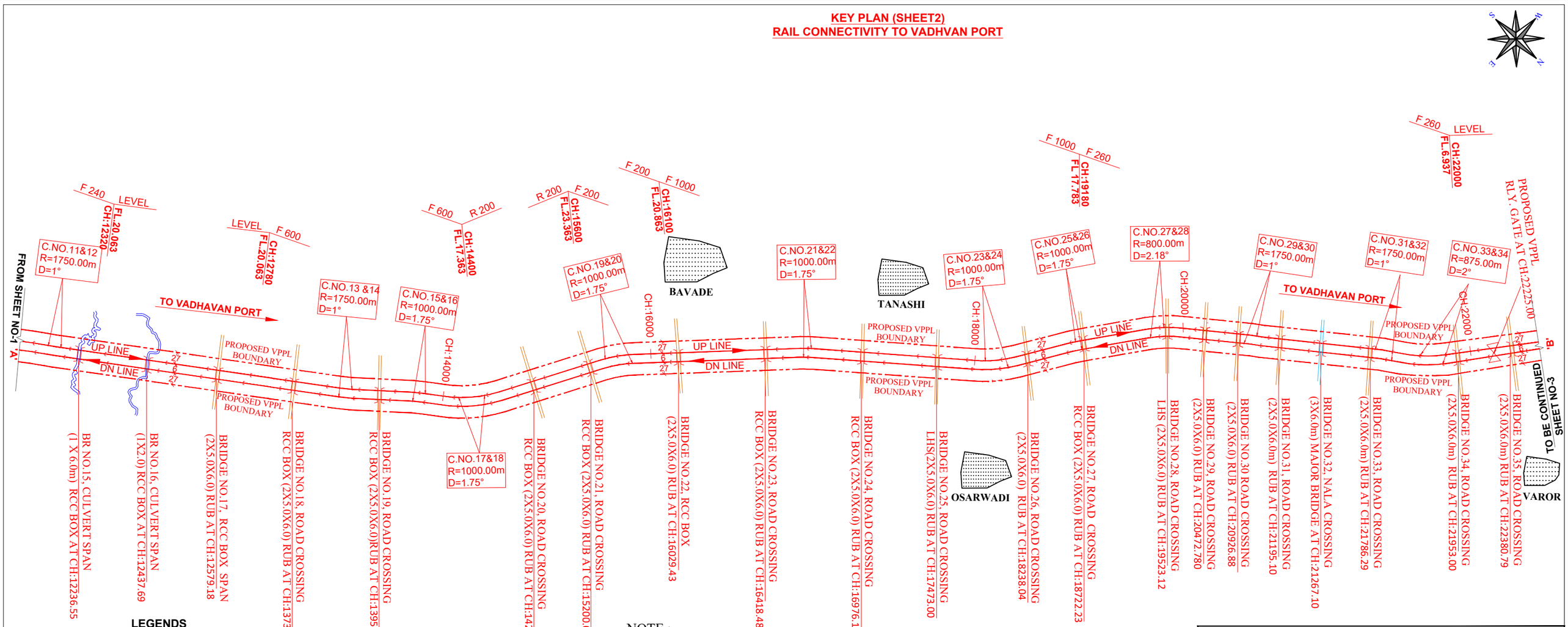
SCALE :- NTS | DATE :- 22.08.2023 | PAPER SIZE :- A3

CLIENT: JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)

PROJECT: DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

CONSULTANT: M R Technofin Consultants Pvt. Ltd.,
Office: G 507 Kailas Industrial Complex,Park Site, Vikhroli(W), Mumbai- 400079, India. Tel. +91 22 25182678
web.: www.mrtcpl.com
Email: admin@mrtcpl.com

KEY PLAN (SHEET2)
RAIL CONNECTIVITY TO VADHVAN PORT



LEGENDS

PROP. VPPL LINE	
PROP. VPPL BOUNDARY	
PROP. OHE LINE	
PROP. BRIDGE	
NALA	
ROAD	
CANAL	

PROP. TRACK STRUCTURE (VPPL SIDING)		
SR. NO.	DESCRIPTION	VALUE
01	RAIL (BG)	60 KG
02	SLEEPER	PSC (1660 Nos Per Km)
03	BALLAST	350 mm

NOTE :

1. ALL DIMENSIONS ARE IN METERS.
2. PROPOSED 'WORK SHOWN IN 'RED' COLOR.
3. PROP. VPPL BOUNDARY SHOWN IN 'RED DOTTED' COLOR.

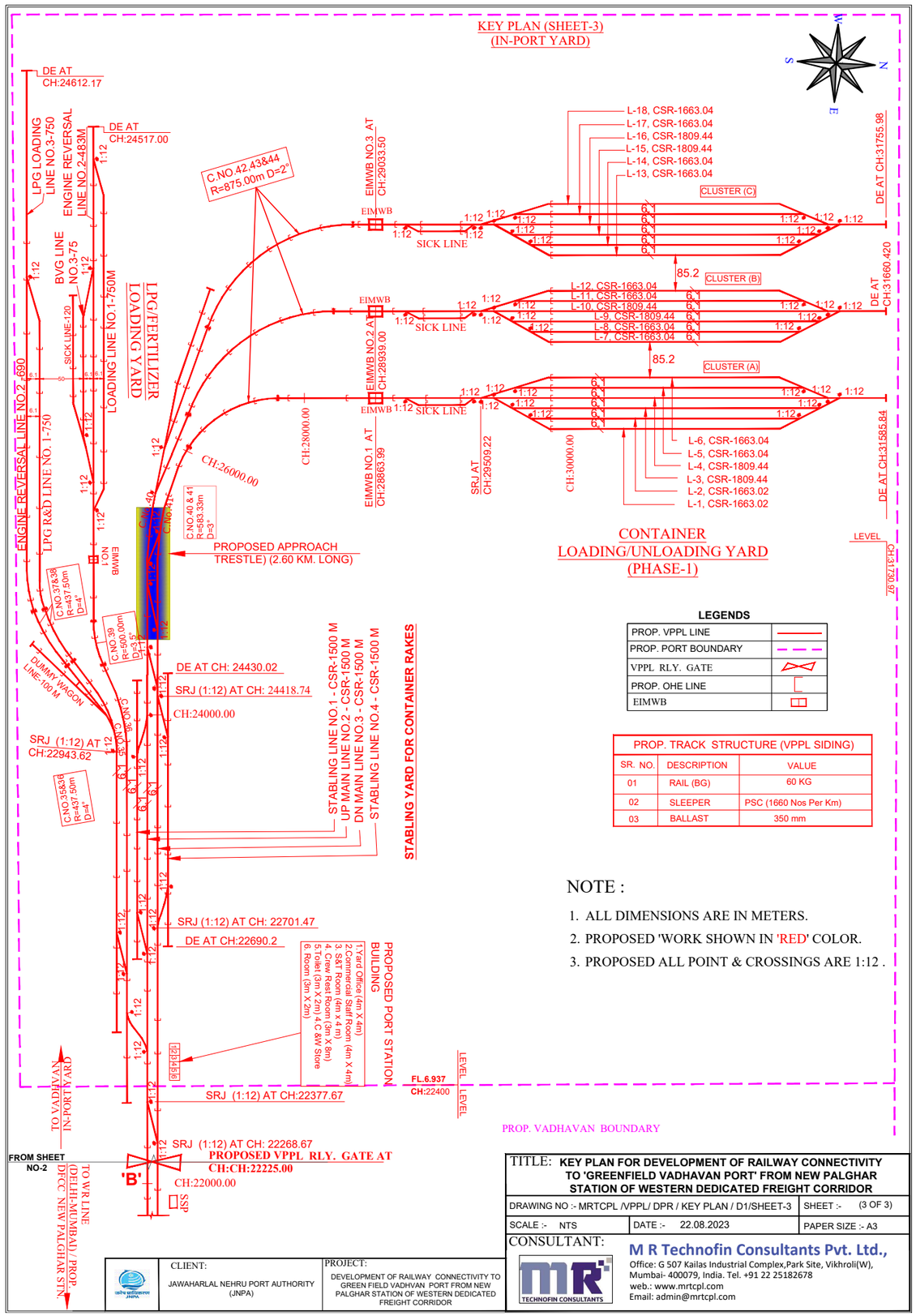
CLIENT: JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)

PROJECT: DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

TITLE: KEY PLAN FOR DEVELOPMENT OF RAILWAY CONNECTIVITY TO 'GREENFIELD VADHAVAN PORT' FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

DRAWING NO :- MRTCPL / VPPL/DPR/KEY PLAN / D1/SHEET-2		SHEET :- (2 OF 3)
SCALE :- NTS	DATE :- 22.08.2023	PAPER SIZE :- A3

CONSULTANT:
M R Technofin Consultants Pvt. Ltd.,
Office: G 507 Kailas Industrial Complex,Park Site, Vikhroli(W), Mumbai- 400079, India. Tel. +91 22 25182678
web.: www.mrtcpl.com
Email: admin@mrtcpl.com



LEGENDS

PROP. VPPL LINE	
PROP. PORT BOUNDARY	
VPPL RLY. GATE	
PROP. OHE LINE	
EIMWB	

PROP. TRACK STRUCTURE (VPPL SIDING)		
SR. NO.	DESCRIPTION	VALUE
01	RAIL (BG)	60 KG
02	SLEEPER	PSC (1660 Nos Per Km)
03	BALLAST	350 mm

NOTE :

1. ALL DIMENSIONS ARE IN METERS.
2. PROPOSED 'WORK SHOWN IN 'RED' COLOR.
3. PROPOSED ALL POINT & CROSSINGS ARE 1:12 .

CLIENT:
JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)

PROJECT:
DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

TITLE: **KEY PLAN FOR DEVELOPMENT OF RAILWAY CONNECTIVITY TO 'GREENFIELD VADHAVAN PORT' FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR**

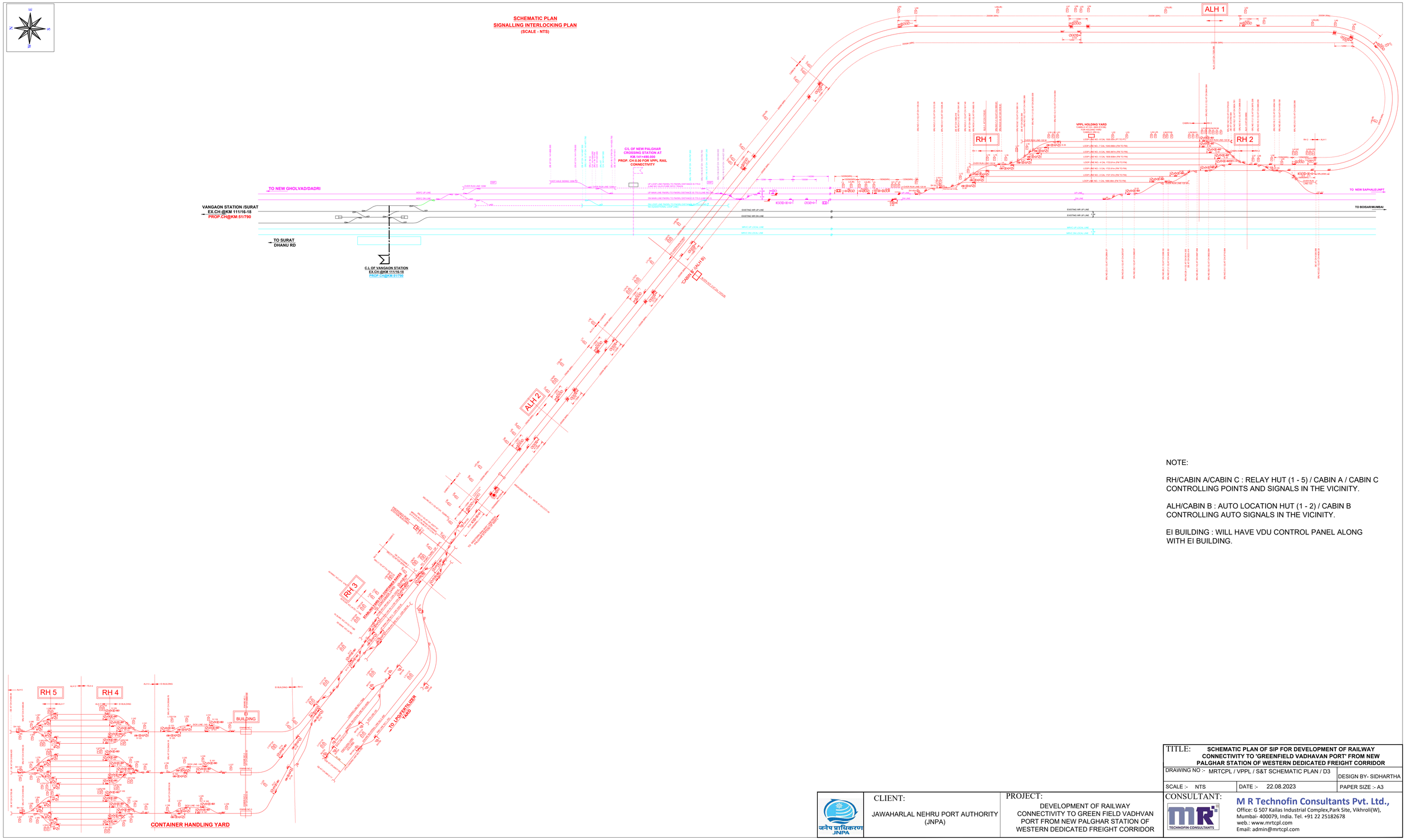
DRAWING NO :- MRTCPL /VPPL/ DPR / KEY PLAN / D1/SHEET-3 | SHEET :- (3 OF 3)

SCALE :- NTS | DATE :- 22.08.2023 | PAPER SIZE :- A3

CONSULTANT:
M R Technofin Consultants Pvt. Ltd.,
Office: G 507 Kailas Industrial Complex,Park Site, Vikhroli(W), Mumbai- 400079, India. Tel. +91 22 25182678
web.: www.mrtcpl.com
Email: admin@mrtcpl.com

VADHVAN PORT

SCHEMATIC PLAN
SIGNALLING INTERLOCKING PLAN
(SCALE - NTS)



NOTE:

RH/CABIN A/CABIN C : RELAY HUT (1 - 5) / CABIN A / CABIN C CONTROLLING POINTS AND SIGNALS IN THE VICINITY.

ALH/CABIN B : AUTO LOCATION HUT (1 - 2) / CABIN B CONTROLLING AUTO SIGNALS IN THE VICINITY.

EI BUILDING : WILL HAVE VDU CONTROL PANEL ALONG WITH EI BUILDING.

TITLE: **SCHEMATIC PLAN OF SIP FOR DEVELOPMENT OF RAILWAY CONNECTIVITY TO 'GREENFIELD VADHAVAN PORT' FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR**			
DRAWING NO :- MRTCPL / VPPL / S&T SCHEMATIC PLAN / D3			DESIGN BY- SIDHARTHA
SCALE :- NTS		DATE :- 22.08.2023	PAPER SIZE :- A3
CLIENT: JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)	PROJECT: DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR	CONSULTANT:	**M R Technofin Consultants Pvt. Ltd.,** Office: G 507 Kailas Industrial Complex,Park Site, Vikhroli(W), Mumbai- 400079, India. Tel. +91 22 25182678 web.: www.mrtcpl.com Email: admin@mrtcpl.com

ENGINEERING SCALE PLAN
VPPL HOLDING YARD (SHEET 1 OF 5)
(SCALE 1:2500)

STATEMENT OF CURVES

SR. NO.	CURVE NO.	DEFLECTION ANGLE			RADIUS & DEGREE OF CURVE		TANGENT LENGTH	CURVE LENGTH	CHAINAGE OF CURVE	
		DEG.	MIN.	SEC.	RADIUS	DEGREE			START(TP-I)	END(TP-II)
01.	1 (LH)	94	56	16	500M	3.5°	545.060M	828.49M	4140.19	4968.68
02.	2 (LH)	94	56	16	480M	3.6°	523.257M	795.35M	4168.29	4963.64

BRIDGE DETAILS

Prop.Br.No.	Chainage	EX.Bridge no./LC	Span
1	1079.41	PROP.RUB (UNDER CONSTRUCTION)	1 X 5.5M X 4.5 M RUB
2	2496.05	152 (CH:106/6-8)	EX.SPAN-1 X 1.70 ,RCC SLAB PROP.RCC BOX (1 X 2.0 M)
3	3084.88	152 (CH:1105/18.20)	EX.SPAN- 1 X 6.10 ,RCC SLAB PROP. PSC SLAB (1 X 6.10M)
4	3528.28	MANNED LEVEL CROSSING NO.53 AT KM 105/04-06	PROP.RUB (1 X 5.0 X 6.0M)
5	3689.28	BRIDGE NO.151 CH:105/2-4	EX.SPAN- 1 X 2.3M RCC BOX PROP.RCC BOX(1 X3.0M)

ABBREVIATION

TS	TRANSITION START
ST	TRANSITION END
SC	START OF CURVE
CS	END OF CURVE

PROP. TRACK STRUCTURE (VPPL SIDING)

SR. NO.	DESCRIPTION	VALUE
01	RAIL (BG)	60 KG
02	SLEEPER	PSC (1660 Nos Per Km)
03	BALLAST	350 mm

NOTE :

1. ALL DIMENSIONS ARE IN METERS.
2. VPPL WORK SHOWN IN 'RED' COLOR.
3. EXISTING WORK SHOWN IN 'BLACK' COLOR.
4. THROUGH CHAINAGES ARE RECKONED FROM CENTER LINE OF NEW PALGHAR RAILWAY STATION.
5. DESIGN SPEED =100KMPH FOR LEAD LINE AND FOR PORT YARD SPEED = 50 KMPH
6. NEW PALGHAR NEW STATION YARD LAYOUT IS PREPARED BASED ON APPROVED DRWG. NO. 1/AL/DG/9802-CD REV.4 DATED 12/06/2018.
7. TOPOGRAPHIC SURVEY FOR AREA OF WEST OF MRVC LINE UP TO PROPOSED VPPL ENTRY GATE WAS PREVIOUSLY CARRIED OUT BY JNPA, SEPERATELY.

CONSULTANT

CHECKED:- B.K. GHOSH
DESIGN:- PRIYANKA BHUSHARI
DRAWN:- REENA VICHARE

M. R. TECHNOFIN CONSULTANTS PVT LTD.
G-507 Kailas Industrial Complex,Park Site,
Vikhroli(W), Mumbai- 400079, India
Tel. , +91 22 25182678

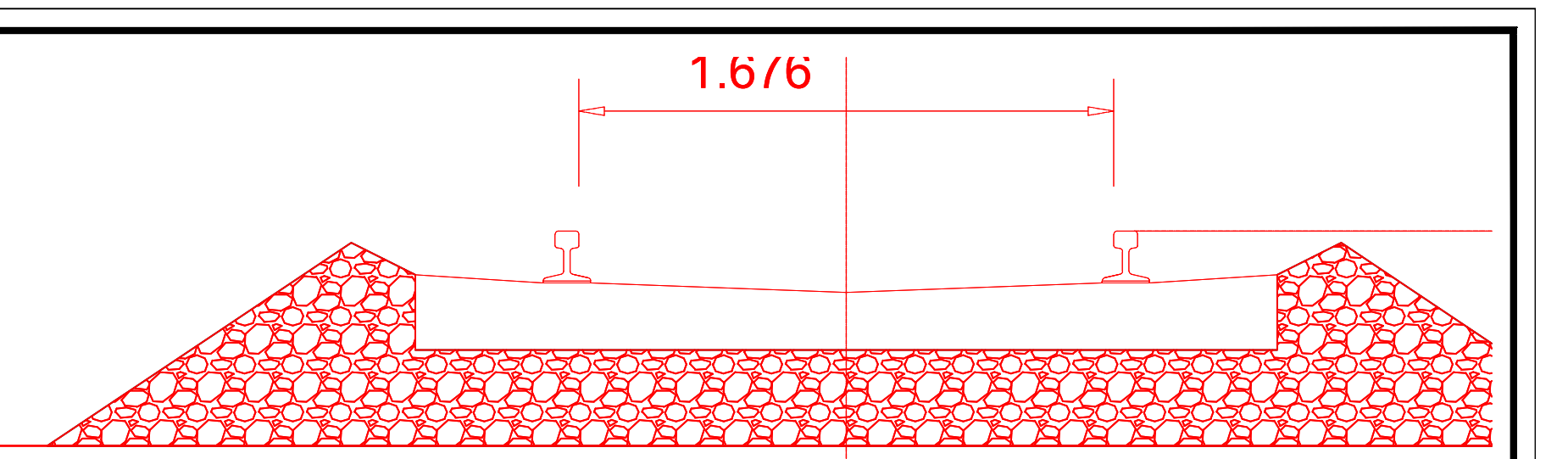
CLIENT : JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)

PROJECT : DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

TITLE : PLAN & L-SECTION FROM CH:0.00 TO CH:5000.00

DWG.NO :- MRTCPL/VPPL/DPR/PLAN/LS/R0/D2/SHEET 1

SCALE:- 1:2500		PAPER SIZE :- 594 X 2250MM
REV:-R0	DATE:- 19.08.2023	SHEET:- 1 OF 5



STATEMENT OF CURVES

SR. NO.	CURVE NO.	DEFLECTION ANGLE			RADIUS & DEGREE OF CURVE		TANGENT LENGTH	CURVE LENGTH	CHAINAGE OF CURVE	
		DEG.	MIN.	SEC.	RADIUS	DEGREE			START(TP-I)	END(TP-II)
03	3 (LH)	58	48	44	875M	2.0°	545.060M	898.16M	5248.87	6147.03
04	4 (LH)	58	48	44	875M	2.0°	545.060M	898.16M	5252.26	6150.42
05	5 (LH)	72	34	55	875M	2.0°	642.539M	1108.44M	7441.23	8549.67
06	6 (LH)	72	34	55	875M	2.0°	642.539M	1108.44M	7445.63	8554.07

STATEMENT OF BRIDGE

BRIDGE NO.	CHAINAGE	PROP. BRIDGE DETAILS	TYPE OF CROSSING
6	5176.38	RCC BOX (2 X 5.0 X 6.0M) RUB	ROAD
7	6503.43	RCC BOX (2 X 5.0 X 6.0M) ROB	ROAD
8	7509.29	RCC BOX (2 X 5.0 X 6.0M) ROB	ROAD
9	8679.40	RCC BOX (2 X 5.0 X 6.0M) RUB	ROAD
10	9646.70	RCC BOX (2 X 5.0 X 6.0M) RUB	ROAD

LEGENDS

EXIST.WR LAND BOUNDARY	
EXIST. WR LINE	
PROP.MRVC LINE	
PROP.DFCC LINE	
PROP.DFCC FUTURE LINE	
PROP.DFCC LOOP LINE	
PROP.DFCC BOUNDARY LINE	
PROP. VPPL LINE	
CANAL CROSSING	

LEGENDS

PROP.VPPL BOUNDARY	
PROP. VPPL LINE	
VILLAGE ROAD	
KACHA ROAD	
DIVERSION OF ROAD	

ABBREVIATION

TS	TRANSITION START
ST	TRANSITION END
SC	START OF CURVE
CS	END OF CURVE

PROP. TRACK STRUCTURE (VPPL SIDING)

SR. NO.	DESCRIPTION	VALUE
01	RAIL (BG)	60 KG
02	SLEEPER	PSC (1660 Nos Per Km)
03	BALLAST	350 mm

NOTE :

1. ALL DIMENSIONS ARE IN METERS.
2. VPPL WORK SHOWN IN **'RED'** COLOR.
3. EXISTING WORK SHOWN IN **'BLACK'** COLOR.
4. THROUGH CHAINAGES ARE RECKONED FROM CENTER LINE OF **NEW PALGHAR RAILWAY** STATION.
5. DESIGN SPEED =100KMPH FOR LEAD LINE AND FOR PORT YARD SPEED = 50 KMPH
6. NEW PALGHAR NEW STATION YARD LAYOUT IS PREPARED BASED ON APPROVED DRWG. NO. 1/AL/DG/9802-CD REV.4 DATED 12/06/2018.
7. TOPOGRAPHIC SURVEY FOR AREA OF WEST OF MRVC LINE UP TO PROPOSED VPPL ENTRY GATE WAS PREVIOUSLY CARRIED OUT BY JNPA, SEPERATELY.

CONSULTANT

CHECKED:- B.K. GHOSH
DESIGN:- PRIYANKA BHUSHARI
DRAWN:- REENA VICHARE

M. R. TECHNOFIN CONSULTANTS PVT LTD.
G-507 Kailas Industrial Complex,Park Site,
Vikhroli(W), Mumbai- 400079, India
Tel. , +91 22 25182678

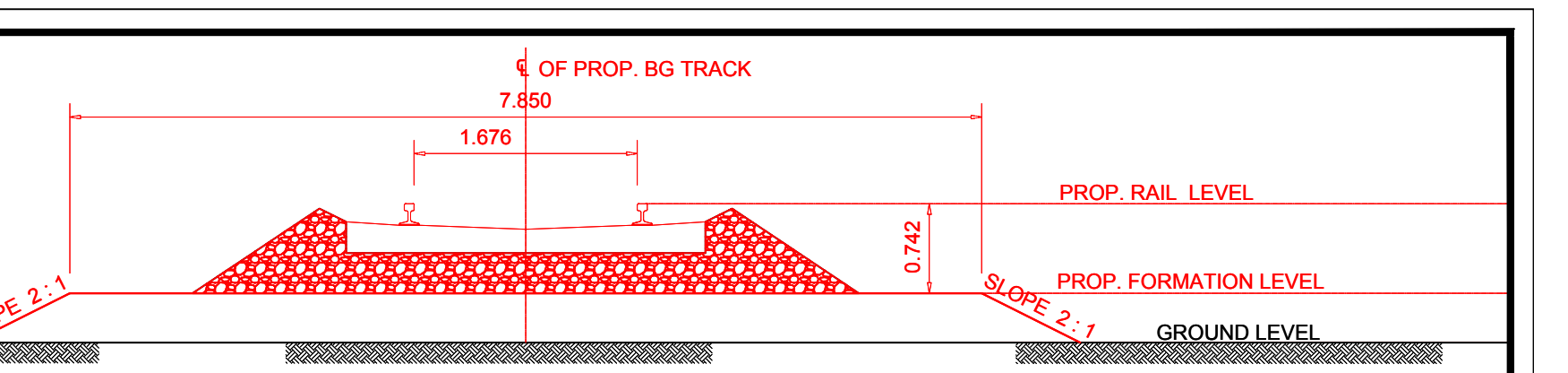
CLIENT : JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)

PROJECT : DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

TITLE : PLAN & L-SECTION
FROM CH:5000.0 TO CH:10000.00

DWG.NO :- MRTCPL/VPPL/DPR/PLAN/LS/R0/D2/SHEET 2

SCALE:- 1:2500		PAPER SIZE :- 594 X 2250MM
REV:-R0	DATE:- 19.08.2023	SHEET:- 2 OF 5



TYPICAL CROSS SECTION
SCALE - 1 : 5

PROP. TRACK STRUCTURE (VPPL SIDING)		
SR. NO.	DESCRIPTION	VALUE
01	RAIL (BG)	60 KG
02	SLEEPER	PSC (1660 Nos Per Km)
03	BALLAST	350 mm

ABBREVIATION	
TS	TRANSITION START
ST	TRANSITION END
SC	START OF CURVE
CS	END OF CURVE

STATEMENT OF CURVES

SR. NO.	CURVE NO.	DEFLECTION ANGLE			RADIUS & DEGREE OF CURVE		TANGENT LENGTH	CURVE LENGTH	CHAINAGE OF CURVE	
		DEG.	MIN.	SEC.	RADIUS	DEGREE			START(TP-I)	END(TP-II)
07	7 (LH)	1	37	53	1750M	1.0°	24.916M	49.83M	10711.29	10761.12
08	8 (RH)	1	38	9	1750M	1.0°	24.984M	49.96M	10711.23	10761.19
09	9 (LH)	1	37	48	1750M	1.0°	24.894M	49.79M	10825.31	10875.10
10	10 (RH)	1	38	14	1750M	1.0°	25.005M	50.00M	10825.21	10875.21
11	11 (RH)	1	34	23	1750M	1.0°	24.025M	48.05M	11534.38	11582.43
12	12 (LH)	1	34	18	1750M	1.0°	24.003M	48.01M	11534.26	11582.27
13	13 (LH)	1	34	15	1750M	1.0°	23.991M	47.98M	11652.25	11700.23
14	14 (RH)	1	34	23	1750M	1.0°	24.0251M	48.05M	11652.13	11700.18
15	15 (RH)	4	46	8	1000M	1.75°	41.640M	83.23M	11959.52	12042.75
16	16 (RH)	4	46	11	1000M	1.75°	41.650M	83.25M	11959.74	12042.99
17	17 (LH)	7	13	49	1000M	1.75°	63.18M	126.19M	12383.44	12509.63
18	18 (LH)	7	13	49	1000M	1.75°	63.18M	126.19M	12383.32	12509.51
19	19 (RH)	6	10	8	1000M	1.75°	53.89M	107.67M	12812.58	12920.25
20	20 (RH)	6	10	8	1000M	1.75°	53.89M	107.67M	12812.51	12920.18
21	21 (LH)	12	15	22	1000M	1.75°	107.36M	213.91M	14121.48	14335.39
22	22 (LH)	12	15	22	1000M	1.75°	107.36M	213.91M	14121.09	14335.00

STATEMENT OF BRIDGE

BRIDGE NO.	CHAINAGE	PROP. BRIDGE DETAILS	TYPE OF CROSSING
11	10272.67	PSC GIRDER (1 X12.2M)	CANAL
12	10650.00	RCC BOX (2 X 5.0 X 6.0M) RUB	ROAD
13	10966.36	PSC GIRDER (1 X12.2M)	CANAL
14	11294.71	ROR	RAIL
15	12236.55	RCC BOX (1 X 6.0m) CULVERT	NALA
16	12437.69	RCC BOX (1 X 2.0m) CULVERT	NALA
17	12579.18	RCC BOX (2X5.0X6.0) RUB	ROAD
18	13739.51	RCC BOX (2X5.0X6.0) RUB	ROAD
19	13950.00	RCC BOX (2X5.0X6.0) RUB	ROAD
20	14205.00	RCC BOX (2X5.0X6.0) RUB	ROAD

LEGENDS

PROP.RAILWAY BOUNDARY	
PROP. VPPL LINE	
VILLAGE ROAD	
KACHA ROAD	
DIVERSION OF ROAD	
NALA	
DISMANTLE OF ROAD	
CANAL CROSSING	

NOTE :

1. ALL DIMENSIONS ARE IN METERS.
2. VPPL WORK SHOWN IN 'RED' COLOR.
3. EXISTING WORK SHOWN IN 'BLACK' COLOR.
4. THROUGH CHAINAGES ARE RECKONED FROM CENTER LINE OF NEW PALGHAR RAILWAY STATION.
5. DESIGN SPEED =100KMPH FOR LEAD LINE AND FOR PORT YARD SPEED = 50 KMPH
6. NEW PALGHAR NEW STATION YARD LAYOUT IS PREPARED BASED ON APPROVED DRWG. NO. 1/AL/DG/9802-CD REV.4 DATED 12/06/2018.
7. TOPOGRAPHIC SURVEY FOR AREA OF WEST OF MRVC LINE UP TO PROPOSED VPPL ENTRY GATE WAS PREVIOUSLY CARRIED OUT BY JNPA, SEPERATELY.

CONSULTANT

CHECKED:- B.K. GHOSH
DESIGN:- PRIYANKA BHUSHARI
DRAWN:- REENA VICHARE

M. R. TECHNOFIN CONSULTANTS PVT LTD.
G-507 Kailas Industrial Complex,Park Site,
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Tel. , +91 22 25182678

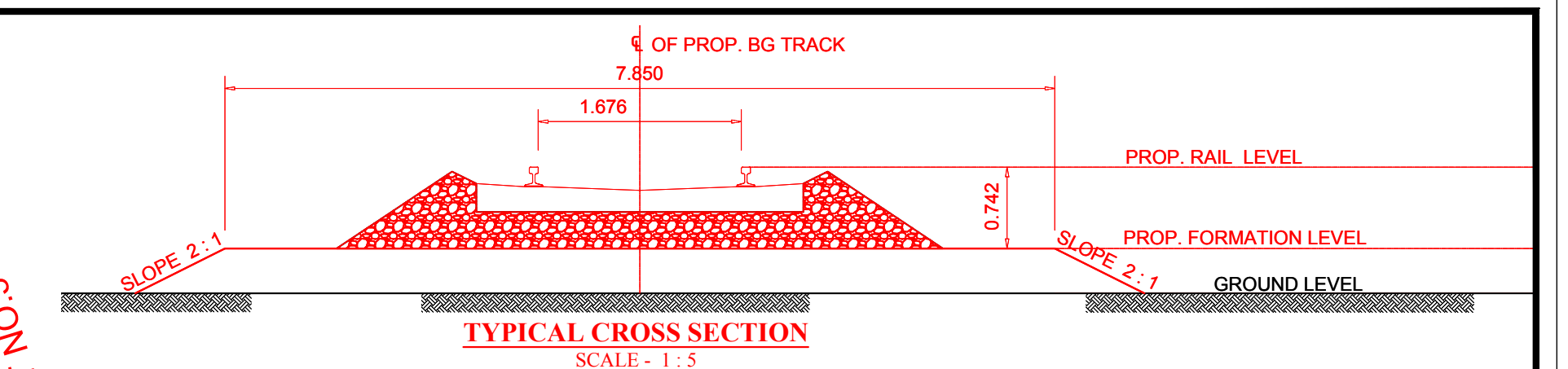
CLIENT : JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)

PROJECT : DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

TITLE : PLAN & L-SECTION
FROM CH:10000.00 TO CH:15000.00

DWG.NO :- MRTCPL/VPPL/DPR/PLAN/LS/R0/D2/SHEET-3

SCALE:- 1:2500		PAPER SIZE :- 594 X 2250MM
REV:-R0	DATE:- 19.08.2023	SHEET:- 3 OF 5



STATEMENT OF CURVES

SR. NO.	CURVE NO.	DEFLECTION ANGLE			RADIUS & DEGREE OF CURVE		TANGENT LENGTH	CURVE LENGTH	CHAINAGE OF CURVE	
		DEG.	MIN.	SEC.					START(TP-I)	END(TP-II)
23	23 (LH)	12	3	16	1000M	1.75°	105.58M	210.39M	14849.33	15059.72
24	24 (LH)	12	3	16	1000M	1.75°	105.58M	210.39M	14850.22	15058.72
25	25 (RH)	13	23	35	1000M	1.75°	117.41M	233.76M	16222.35	16456.11
26	26 (RH)	13	23	35	1000M	1.75°	117.41M	233.76M	16222.28	16456.03
27	27 (LH)	21	11	41	800M	2.18°	146.68M	295.93M	19080.06	19375.99
28	28 (LH)	21	11	41	800M	2.18°	146.68M	295.93M	19080.04	19376.47

STATEMENT OF BRIDGE

BRIDGE NO.	CHAINAGE	PROP. BRIDGE DETAILS	TYPE OF CROSSING
21	15200.00	RCC BOX (2X5.0X6.0) RUB	ROAD
22	16029.43	RCC BOX (2X5.0X6.0) RUB	ROAD
23	16418.48	RCC BOX (2X5.0X6.0) RUB	ROAD
24	16976.15	RCC BOX (2X5.0X6.0) RUB	ROAD
25	17473.00	RCC BOX (2X5.0X6.0) RUB	ROAD
26	18238.04	RCC BOX (2X5.0X6.0) RUB	ROAD
27	18722.23	RCC BOX (2X5.0X6.0) RUB	ROAD
28	19523.12	RCC BOX (2X5.0X6.0) RUB	ROAD

ABBREVIATION

TS	TRANSITION START
ST	TRANSITION END
SC	START OF CURVE
CS	END OF CURVE

PROP. TRACK STRUCTURE (VPPL SIDING)

SR. NO.	DESCRIPTION	VALUE
01	RAIL (BG)	60 KG
02	SLEEPER	PSC (1660 Nos Per Km)
03	BALLAST	350 mm

LEGENDS

- PROP.RAILWAY BOUNDARY
- PROP. VPPL LINE
- VILLAGE ROAD
- KACHA ROAD
- DIVERSION OF ROAD
- NALA
- DISMANTLE OF ROAD

NOTE :

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7. TOPOGRAPHIC SURVEY FOR AREA OF WEST OF MRVC LINE UP TO PROPOSED VPPL ENTRY GATE WAS PREVIOUSLY CARRIED OUT BY JNPA, SEPERATELY.

CONSULTANT

TECHNOFIN CONSULTANTS

CHECKED:- B.K. GHOSH
DESIGN:- PRIYANKA BHUSHARI
DRAWN:- REENA VICHARE

M. R. TECHNOFIN CONSULTANTS PVT LTD.
G-507 Kailas Industrial Complex,Park Site,
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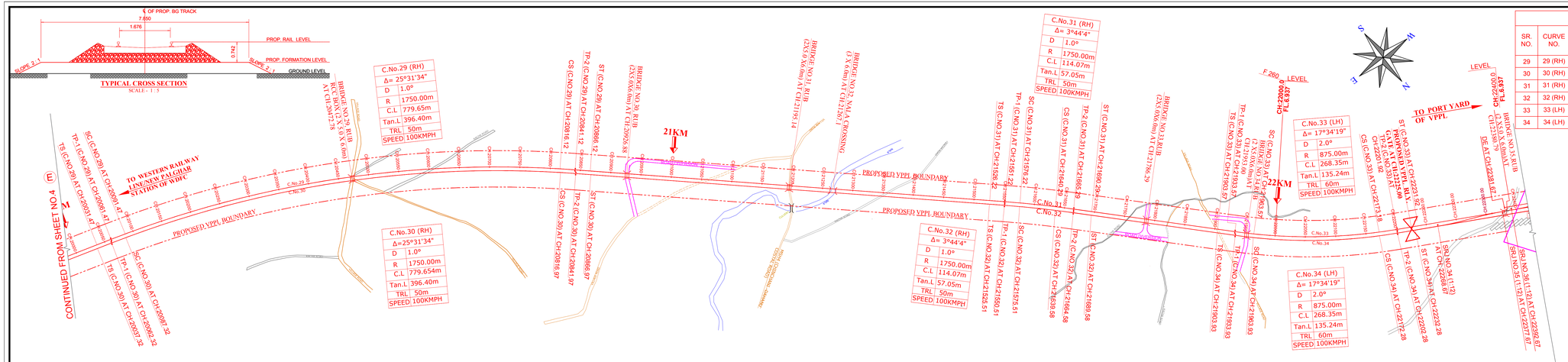
Tel. , +91 22 25182678

CLIENT : JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)

PROJECT : DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

TITLE : PLAN & L-SECTION
FROM CH:15000.00 TO CH:20000.00

DWG.NO :-	MRTCPL/VPPL/DPR/PLAN/LS/R0/D2/SHEET 4	
SCALE:- 1:2500		PAPER SIZE :- 594 X 2250MM
REV:-R0	DATE:- 19.08.2023	SHEET:- 4 OF 5



STATEMENT OF CURVES

SR. NO.	CURVE NO.	DEFLECTION ANGLE			RADIUS & DEGREE OF CURVE		TANGENT LENGTH	CURVE LENGTH	CHAINAGE OF CURVE	
		DEG.	MIN.	SEC.	RADIUS	DEGREE			START(TP-I)	END(TP-II)
29	29 (RH)	25	31	34	1750.m	1.0°	396.40m	779.65m	20061.47	20841.12
30	30 (RH)	25	31	34	1750M	1.0°	396.40m	779.65m	20062.32	20841.97
31	31 (RH)	3	44	4	1750M	1.0°	57.05M	114.07m	21551.22	21665.29
32	32 (RH)	3	44	4	1750M	1.0°	57.05M	114.07m	21550.51	21664.58
33	33 (LH)	17	34	19	875M	2.0°	135.24M	268.35M	21933.57	22201.92
34	34 (LH)	17	34	19	875M	2.0°	135.24M	268.35M	21933.93	22202.28

STATEMENT OF BRIDGE

BRIDGE NO.	CHAINAGE	PROP. BRIDGE DETAILS	TYPE OF CROSSING
29	20472.780	RCC BOX (2X5.0X6.0) RUB	ROAD
30	20926.88	RCC BOX (2X5.0X6.0) RUB	ROAD
31	21195.10	RCC BOX (2X5.0X6.0) RUB	ROAD
32	21267.10	RCC BOX (3X6.0) MAJOR BRIDGE	NALA
33	21786.29	RCC BOX (2X5.0X6.0) RUB	ROAD
34	21953.00	RCC BOX (2X5.0X6.0) RUB	ROAD
35	22380.79	RCC BOX (2X5.0X6.0) RUB	ROAD

PROP. TRACK STRUCTURE (VPPL SIDING)

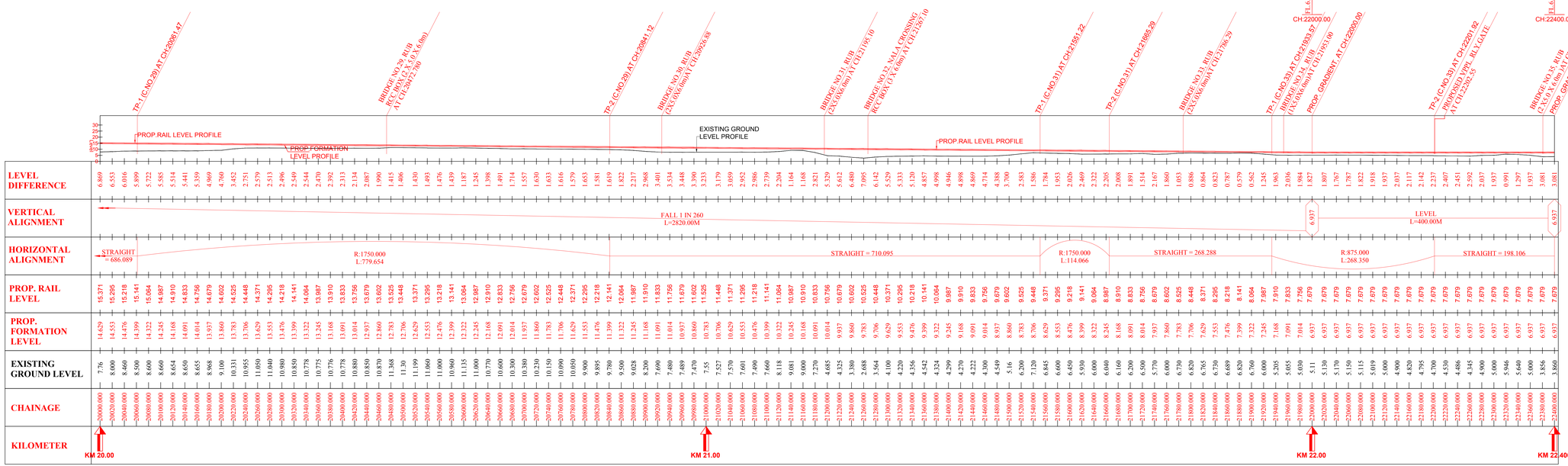
SR. NO.	DESCRIPTION	VALUE
01	RAIL (BG)	60 KG
02	SLEEPER	PSC (1660 Nos Per Km)
03	BALLAST	350 mm

ABBREVIATION

TS	TRANSITION START
ST	TRANSITION END
SC	START OF CURVE
CS	END OF CURVE

LEGENDS

PROP.RAILWAY BOUNDARY
PROP. VPPL LINE
VILLAGE ROAD
KACHA ROAD
DIVERSION OF ROAD
NALA
DISMANTLE OF ROAD



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CLIENT : JAWAHARLAL NEHRU PORT AUTHORITY (JNPA)

PROJECT : DEVELOPMENT OF RAILWAY CONNECTIVITY TO GREEN FIELD VADHVAN PORT FROM NEW PALGHAR STATION OF WESTERN DEDICATED FREIGHT CORRIDOR

TITLE : PLAN & L-SECTION FROM CH:20000.00 TO CH:22400.00

DWG.NO :- MRTCPL/VPPL/DPR/PLAN/LS/R0/D2/SHEET 5

SCALE:-	1:2500	PAPER SIZE :-	594 X 1240MM
REV:-R0	DATE:- 19.08.2023	SHEET:-	5 OF 5